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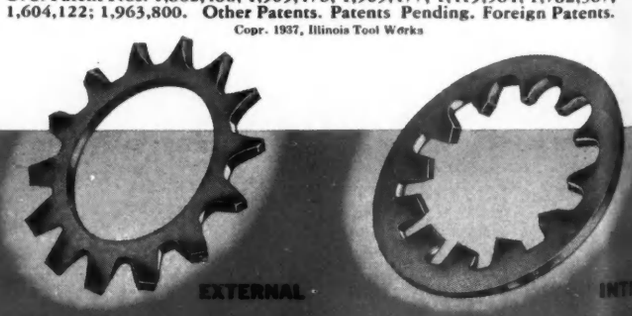

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Published Weekly

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Philadelphia—Chestnut & 56th Sts., Phone Sherwood 1424
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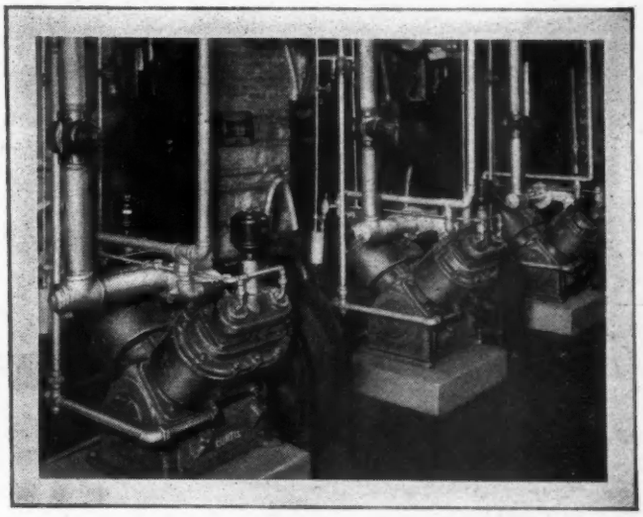

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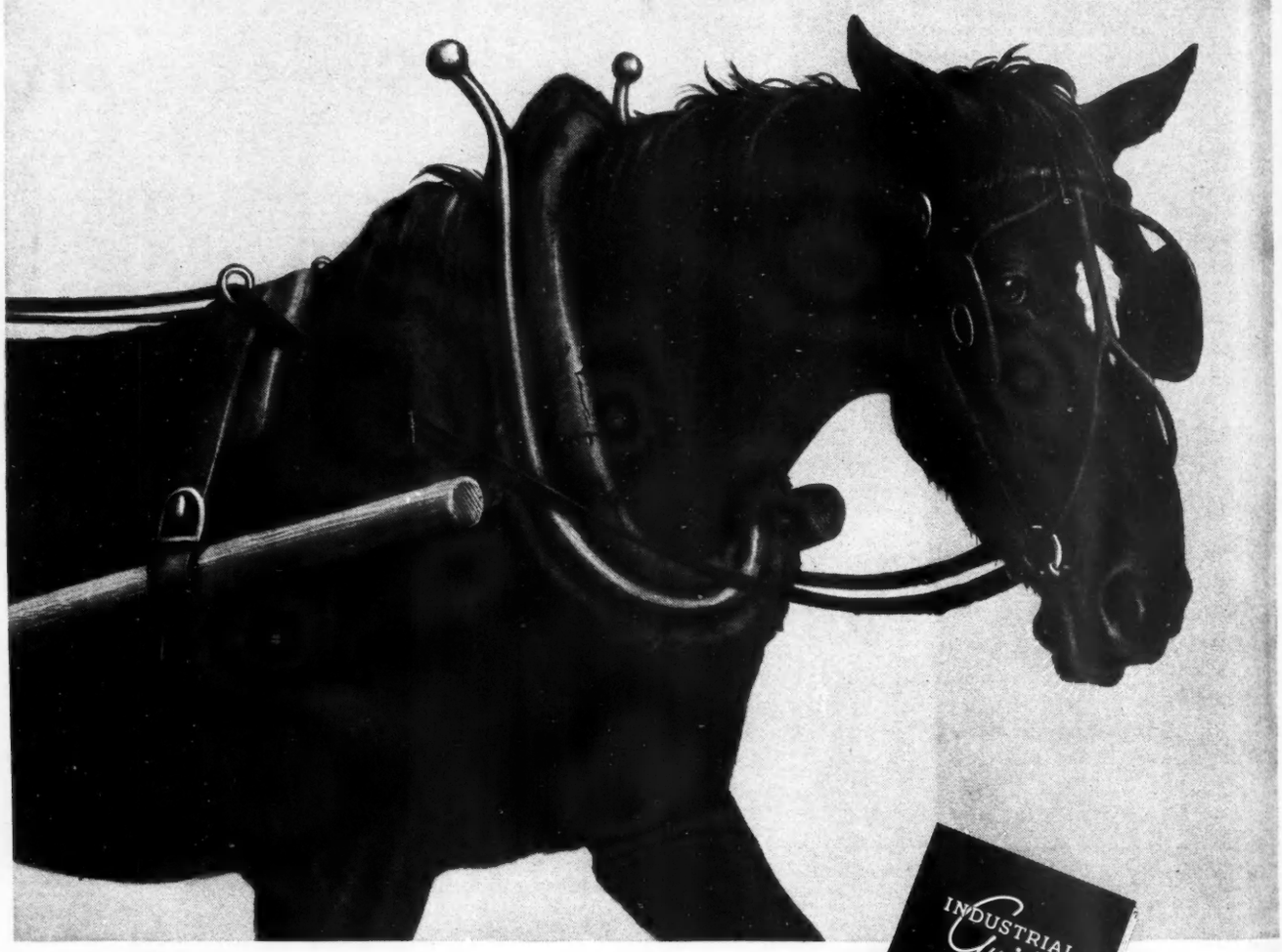

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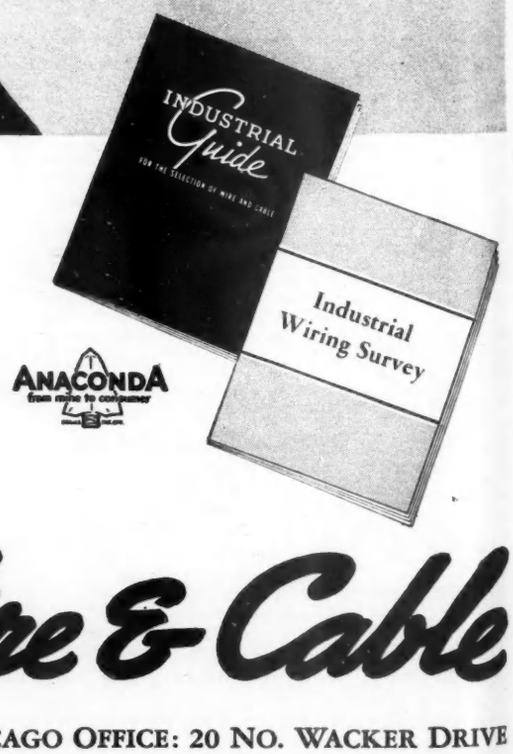

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AUTOMOTIVE INDUSTRIES

Founded 1895 Vol. 76, No. 18

May 1, 1937

This Week

The production of International Harvester trucks presented more than the ordinary production problems. Joseph Geschelin gives the solution of these problems. Read this enlightening story on page 650.

The labor situation at the Caterpillar plant has aroused considerable interest of late. Factually the whole story is told in an article beginning on page 666.

The mechanical drawings this week show the Renault eight-cylinder "Nerva" Engine. See pages 667 and 668.

Field Stocks Are Low

Although Car Plants Are Operating at New Peak, Retail Demand Keeps Inventories Under Normal

By Harold E. Gronseth

The retail market continues to absorb all the motor vehicles the manufacturers can produce. With output at a new high for the year, car shortages still persist and little headway is being made in building up field stocks. Dealers have been operating with inadequate inventories of new cars all year and probably will be short of their requirements for weeks to come. Heavy banks of unfilled retail orders are still in the hands of dealers.

Although March sales established a new all-time high for that month, exceeding even the March, 1929, volume, this record business was done on stocks that were 25 per cent lower than a year ago. Passenger car stocks were reduced 12 per cent during March and dealers went into the peak selling season with a scant three weeks' supply on hand. Normally they should have had about two months' supply.

Ordinarily dealer inventories should be at their peak just before the spring selling season starts but this year labor troubles prevented the factories from attaining that goal and for several weeks retail demand is expected to keep abreast of the industry's full production. It will probably be late in June before output can make any appreciable headway over sales, and stocks then will have to be built up to carry dealers through the change-over period late in the summer. There are just a few exceptions where field stocks now are about as high as they should be. For the most part, the manufacturers will find it necessary to operate at the current peak rate throughout the second quarter.

March sales of cars and trucks in the domestic market are estimated at 480,253 units comparing with 399,000 in March last year, a gain of 20 per

(*Turn to page 647, please*)

New Unions Compete with UAW

Opposition to CIO Methods and Lower Dues Are Features of Rival Automotive Labor Organizations

Organized labor in the automobile industry is dividing up into competing unions such as existed under the old Automobile Labor Board before the United Automobile Workers union began its big drive for membership. It is too early to say whether the UAW's supremacy is threatened but certainly it is being challenged by the formation of two new unions, now engaged in active organization campaigns.

Announcement was made a week ago of the newly formed American Labor League which aspires to national influence. Now comes word of the organization of the Independent Automobile Employes Association in Flint, a coalition of various independent groups of automobile workers in General Motors plants.

The new unions are bitterly opposed to the CIO and its methods, and are incorporating under Michigan laws so as to be recognized as responsible bargaining agencies. The Flint association "is strictly an automobile worker's organization, created by the spontaneous action of the workers in the plants. It is entirely a voluntary organization and no coercion or intimidation of any kind is to have any part of the association," the committee's announcement said.

"There have been grievances existing in the Flint factories and there will be grievances in the future," the announcement declared. "We hold that an organization such as ours, without any connection with General Motors Corp., maintained and supported by the workers themselves, with representatives elected by them, can arbitrate, bargain and adjudicate all differences without resort to unlawful and ungentlemanly tactics."

The new Flint union is to comprise four locals, one each for Fisher Body, Buick, Chevrolet and AC Spark Plug, with an elective vice-president for each division who will be a member of the executive council and the board of strategy. A full time president will serve on a salary basis and a public relations counsel is to be elected. A platform was adopted by unanimous vote at the first general membership meeting and temporary officers chosen. Organization work has been going on for nearly three weeks and some 6000 members have been enrolled to date. No foreman

(*Turn to page 646, please*)

UAW Wins Packard Election, With 11,588 to 2,655 Vote

The election held by the National Labor Relations Board at the Packard plant April 29, gave a landslide vote to the union—11,588 for the UAW to 2655 against. This was the first election held in an automobile plant under the Wagner Act.

Alvan Macauley, Packard president, following the election, said: "Our employes have expressed their desire by their vote. We are pleased that the matter has been determined peacefully and with apparent good-will all around.

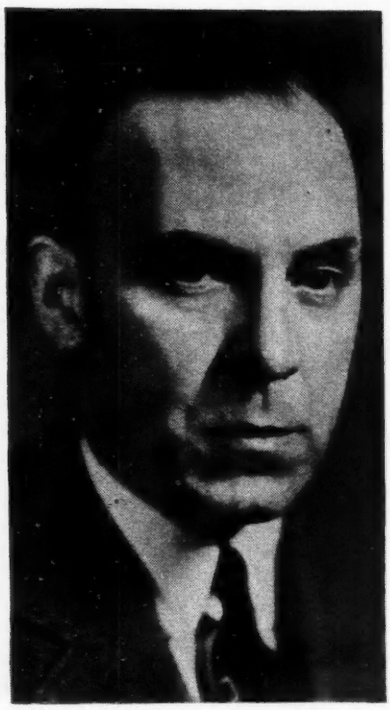
"We especially commend Frank H. Bowen, regional manager of the NLRB, and the fine group of young men with him for the efficient and completely impartial manner in which the election was held," Mr. Macauley added.

GM Forms Diesel Division

To Manufacture Engines from 20 to 160 hp.; Power to Come from a Diesel-Electric Plant, Heat from Dynamometers

The formation of a new division, to be known as the Diesel engine division of General Motors Corp., was announced this week by Alfred P. Sloan, Jr., president. The new division will manufacture a line of Winton Diesel engines, beginning with a 20 hp., single-cylinder unit up to a 160 hp., six-cylinder unit. Single-cylinder units are designed for stationary use only, whereas multi-cylinder units are adaptable to marine, stationary or commercial vehicle use.

The manufacture of Diesel engine fuel enjectors which has been carried on in the General Motors research laboratories for the past seven years will be moved to the new plant, as soon as possible.



W. T. Crowe
who has been appointed general manager of the new General Motors Diesel division

A 75 acre tract of land, located at the intersection of the Pere Marquette Railroad and Outer Drive, Detroit, has been purchased and erection of a new plant will be started at once. The first building to be built will be an engineering laboratory in which all development and test work on Diesel engines for Winton Engine Manufacturers Corp. and Electro-Motive Corp., as well as for the new division, will be carried on. This laboratory will also contain a Diesel-electric power plant for supplying all power to the manufacturing plant. Heating requirements will be supplied through an electrically-heated boiler absorbing current from the test dynamometers.

W. T. Crowe has been appointed general manager of this division. The appointment of other officials will be announced later. Mr. Crowe was born in Detroit, Feb. 25, 1893. He joined the engineering staff of the Hudson Motor Car Co. shortly after graduation from the University of Detroit in 1916, and remained in Detroit until 1918, when he was sent to McCook Field in Dayton, the United States Aviation Section, by appointment of the Hudson Motor Car Co., at the request of the U. S. Government. He was later given an overseas assignment in France where he studied French aviation engineering. He returned to the United States two weeks before the armistice was signed and resumed his position with Hudson in Detroit.

In 1920, Mr. Crowe joined General Motors. From that year until 1925, he served in the capacity of chief engineer of the engine division of General Motors of Canada, at Walkerville, Ont. Later he served as manager of the Detroit office of the export division and was sent to Germany to study automobile manufacturing conditions in that country, having shared in the re-design of the Opel car after Adam Opel of Germany was purchased by General Motors. In 1929 he returned to the United States and was promoted to the staff of O. E. Hunt, vice-president of General Motors Corp. in charge of engineering, from which position he goes to his new post.

Studebaker to Show at Great Lakes Exposition

The Studebaker Corp. has signed a contract for exhibition space at the new 1937 Great Lakes Exposition which opens in Cleveland May 29 and will continue for 101 days.

Latest developments in automotive engineering and design will be exhibited in the Varied Industries Building and a large historical display will be shown in the History of Transportation section of the "Making of a Nation," the central educational feature of the new Great Lakes show.

Plans for the "Making of a Nation" exhibit call for sending a number of displays to Cleveland from the Studebaker museum in South Bend. These include a number of products from the simple blacksmith shop located in Ashland, Ohio, which was the forerunner of the Studebaker carriage and automobile factory, and the Conestoga wagon built in 1830 and used by the Studebaker family in moving to Ashland from Gettysburg, Pa. The first automobile produced by Studebaker, a runabout built in 1902, will be shown along with a progression of models used from that period down to the present day.

Peoria Tractor Meet

SAE Members Visit Caterpillar Plants; New Officers of Activity

Final registration count revealed 336 persons attending the three-day SAE Tractor Meeting held in Peoria, Ill., from April 21 to 23. Executive personnel of the Society on hand for the highly successful session included: H. T. Woolson, president; John A. C. Warner, secretary and general manager; R. S. Burnett, manager, standards department; Elmer McCormick, vice-president representing Tractor and Industrial Power Equipment Engineering.

Members were guests of the Caterpillar Tractor Co. at luncheon the first day and spent two afternoons examining the company's foundry, tractor and road machinery plants. A large group was transported by buses to the Caterpillar test farm to witness field demonstrations of agricultural and road equipment.

At a short business meeting held the last day of the session, five members were elected to the Tractor Activity Nominating Committee which will select a tractor activity vice-presidential nominee for the SAE administrative year 1938. Vice-president

(Turn to page 676, please)

Acme photo

Election Day in Brussels, Belgium, when Premier Van Zeeland won decisively from Leon Degrelle, fascist leader, was enlivened by this parade of midget cars

Caterpillar vs. CIO

Secret Negotiations Discarded In Unique Settlement

EDITOR'S NOTE

Two weeks ago a correspondent sent us an unidentified clipping from a middle-western newspaper, which commented vigorously on the quick settlement in a "novel way" of a sitdown strike affecting the Peoria (Ill.) plants of the Caterpillar Tractor Co. So ephemeral was the strike that it had begun and run its course almost before the newspapers were aware of it. Yet in its brief life was packed almost all of the drama which has come out of much more protracted events in the automobile industry—intensified and accelerated by a new development—unrestricted publicity for the conferences between CIO representatives and company management. To complete our own understanding of what happened we sent a member of our staff to Peoria.

Discarding the curtain of hush which has surrounded most recent conferences between management and union representatives, the Caterpillar Tractor Co. on April 8, brought to an interesting conclusion a sitdown strike which lasted just 51 hours.

Union representatives who came to confer at an earlier meeting found themselves in the presence of company officials, and about 100 representatives of various departments in the Caterpillar plants, as well as reporters and prominent citizens of Peoria. Transcripts of this meeting were taken, from which nothing was eliminated but remarks which by consent of both sides, were regarded as being "off the record." Printed copies of the transcript were distributed to every Caterpillar employe who could be reached.

The April 8 meeting included only management representatives, and those from the CIO and its affiliated iron and steel union which claimed sole jurisdiction in the plants and sought a blanket agreement covering all Caterpillar workers. At this meeting also, the record was printed, and copies distributed, forming a complete history in miniature of the actual words used in the settlement of a labor dispute.

Other negotiations have been interpreted to the press by the principals on both sides, from their respective points of view. Now, for the first time, it is possible to present the actual exchange of words which preceded a labor settlement, together with some of the dramatic atmosphere which surrounded the scene. "Let's look at the record."

A chronological, factual account of "What Happened at Caterpillar," will be found on page 666 of this issue of AUTOMOTIVE INDUSTRIES, together with additional pictures.

THE RECORD

CIO spokesman to Caterpillar's president: *No, you are not snobbish. To the contrary, you have gone through the shop and spoke to your old employes and patted them on the back and held conversations. You are very democratic, if what I have heard of you is true, and I think they are. In fact, I think every executive of this company is very democratic.*

THE PICTURE

B. C. Heacock, president of the Caterpillar Tractor Co., talking to a group of employes outside the plant, during the progress of the strike.

THE RECORD

Executive vice-president of Caterpillar: *We must keep carefully in mind the dual position occupied by your committee. If and when you come to us as the authorized representative of any employe or employes of our company for the purpose of correcting any inequity affecting that employe or those employes, we will, as Mr. Heacock has already assured you, be glad to hear you at any reasonable time. When, however, you seek a meeting with us for the purpose of effecting an agreement, you are coming to us in an entirely different capacity.*

THE PICTURE

. . . shows some members of the CIO committee entering the Caterpillar offices for the meeting which ended the sitdown strike. Joseph Dernoncourt, CIO organizer and spokesman for the group during the conference, is second from right in the picture.

THE RECORD

Mr. Heacock: . . . *members of the press have been out there to report it [the final conference] to the public, and those photographers are there too. Don't you think it would be courtesy and the decent thing to do to let them take a picture after about all but you and Mr. Holt have signed?*

Mr. Dernoncourt: *I think it would be well. I would like to have about three copies signed.*

THE PICTURE

. . . followed. The principals are (l. to r.) Messrs. Dernoncourt, Heacock, and Joseph Vincent, Illinois Labor Board Conciliator.

GM Reports Net of 99 Cents a Share

First Quarter Off 15% Because of Strikes; Studebaker Earns $699,549; Autocar Has Net Profit for Quarter

General Motors Corp. reported net income for the first quarter of $44,814,166, equal after preferred dividends to 99 cents a share on the average amount of common stock outstanding. This compared with $52,464,174 or $1.17 a share for the first three months of 1936. The earnings statement covered the period in which plant strikes interfered with production for 40 days.

Alfred P. Sloan, Jr., president, commented that the company had demonstrated its ability to control expense during the strike period and to resume manufacturing quickly with the result that the decline in earnings was held to approximately 15 per cent.

Net sales, excluding inter-divisional sales, were $336,849,901 for the quarter, against $341,306,065 for the March quarter of 1936. Mr. Sloan said that unit sales for March set a new all-time record.

Cash, United States Government and other marketable securities were $223,715,706 on March 31, against $195,658,172 on Dec. 31, 1936, and against $218,034,223 on March 31, 1936. Net working capital was $378,294,268 on March 31, against $339,686,551 on Dec. 31 and against $355,248,902 a year ago.

Studebaker Nets 32 Cents per Share

The Studebaker Corp. during the first quarter of 1937 earned $699,459 after providing for federal income taxes, except surtax on undistributed profits, according to profit and loss statement and balance sheet released this week by Paul G. Hoffman, president. This amounts to 32 cents per share on the 2,183,243 shares of stock outstanding.

Before provision for federal taxes, earnings for the current quarter were $822,459 compared with $104,655 in the first quarter of 1936, for which period no income tax provision was made. Sales were $19,308,220 compared with $15,738,737 in the corresponding period last year.

The balance sheet showed cash of $6,648,872, sight drafts of $1,767,806 and inventories of $10,836,662. Total current assets were $19,878,662 on March 31, against $14,047,179 last year. Total current liabilities were $7,644,243 against $6,309,246 a year ago.

Yellow Truck Sales Higher

Net sales of Yellow Truck & Coach Manufacturing Co. for the quarter ended March 31, 1937, were $17,737,543. The consolidated net profit for the quarter ended March 31, 1937, amounted to $456,753, after deducting provision for depreciation of $244,776 for plants and equipment and provision for Federal income taxes of $47,140. The above compares with net sales of $10,926,150 and a net profit of $791,042 for the first quarter of 1936.

Autocar Earnings $146,328

The Autocar Co. reports earnings of $146,328 for the first quarter of 1937, compared with a loss of $23,494 for the same period of 1936. The company entered the second quarter with unfilled orders sufficient to sustain the first quarter's high rate of production for the next two or three months.

Exports 42% of Canadian Ford Sales

Total expenditures of the Ford Motor Co. of Canada, Ltd., Windsor, Ont., last year exceeded by $7,000,000 the total receipts from the company's sales in Canada, Wallace R. Campbell, president of the company, reported at the stockholders' annual meeting this week. A regular meeting of the board of directors was held previously and routine matters were discussed. At their session, directors declared a regular quarterly dividend of 25 cents a share, payable June 19 to shareholders of record May 29.

During 1936, Mr. Campbell said, the Canadian company paid out in wages, and salaries and for materials, services, freight, duties and taxes, a total of $28,651,993. Gross revenue from Ford sales during the same period amounted to $21,558,646. The company, however, showed a net profit for the year of $3,356,470, partly as a result of export sales of Ford units made in Canada. "Volume of export shipments in 1936 was 42 per cent of the total dollar volume," Mr. Campbell said. "A decrease in export shipments compared with 1935 is accounted for in part by cessation of shipments to the United Kingdom and Spain."

Mr. Campbell said that during 1936 investments in subsidiary companies overseas increased by $2,315,322 as a result of formation of the New Zealand company and an additional investment of $730,245 in the South African company.

Bendix Aviation Corp. reported for the March quarter net income of $806,508 or 38 cents a share on the 2,097,663 shares of stock. This compared with $860,820 or 41 cents a share for the like portion of the preceding year.

Bower Roller Bearing Co. reports March quarter net profit of $320,212 after surtax on undistributed profits, equal to $1.07 per share. Th's compares with $300,131 in the like 1936 quarter.

Campbell, Wyant & Cannon Foundry Co. reports first quarter net income of $228,449 equal to 65 cents a share compared with $246,628, or 70 cents, a year ago. Operations were affected, it is stated, by production interruptions caused by strikes experienced by some of the customers.

Motor Products Corp. had a March quarter net profit of $703,467 after provision for surtax on undistributed profits, equal to $1.80 per common share against $274,474 in the same quarter last year.

Kelsey-Hayes Wheel Co. and subsidiaries report for the March quarter net profit after all charges including Federal income taxes of $177,677 equal to 61 cents a share on the Class A stock. This compares with net of $325,860 in the same quarter last year.

Passenger Car Production by Wholesale Price Classes

(U. S. and Canada)

Three Months 1937 and 1936 Compared

	1937	1936	Per Cent Change	Per Cent of Total 1937	Per Cent of Total 1936
$500 and under	532,373	512,315	+ 4.0	50.29	56.72
$501-$750	481,947	339,509	+42.0	45.52	37.59
$751-$1000	32,086	36,582	−12.4	3.03	4.05
$1001-$1500	7,852	11,089	−28.9	.74	1.23
$1500-$2000	3,382	2,304	+47.0	.32	.26
$2001-$3000	973	1,295	−24.8	.09	.14
$3001 and over	74	121	−38.8	.01	.01
Total	1,058,687	903,215	+17.0	100.00	100.00

Truck Production by Capacities

(U. S. and Canada)

Three Months 1937 and 1936 Compared

	1937	1936	Per Cent Change	Per Cent of Total 1937	Per Cent of Total 1936
1½ Tons and less	230,145	202,170	+14.0	94.63	94.49
2 to 3 Tons	8,626	8,445	+ 2.1	3.55	3.95
3½ Tons and over	2,859	1,841	+55.2	1.18	.86
Special and Buses	1,564	1,501	+ 4.3	.64	.70
Total	243,194	213,957	+13.8	100.00	100.00

Underwood & Underwood photo

Juan T. Trippe, president of Pan American Airlines, receives from Daniel C. Roper, Secretary of Commerce, the first permit for operating a transatlantic air mail and passenger service. Trial flights will begin soon over the New York to London route, returning via Bermuda. Left to right are: Michael MacWhite, Minister of the Irish Free State; Sir Ronald Lindsay, the British Ambassador; Mr. Trippe; and Secretary Roper.

ICC Control Needed

Uniform Regulation Essential to Inter-State Commerce

Prediction that the Interstate Commerce Commission will exercise exclusive jurisdiction over the size and weight of interstate vehicles in order that state lines will cease to be barriers was made yesterday by Robert K. Carter, president, Carter Brothers of Richmond, Va., in addressing the round table conference on transportation at the 25th annual meeting of the Chamber of Commerce of The United States. Carter declared that uniformity in regulation is an absolute essential to the free flow of interstate commerce. He declared that with reasonable regulation, reasonable taxation, and with uniformity of laws the trucking industry will continue to serve the business of America to an extent which as yet cannot be visualized.

Speaking on a labor relations program, P. W. Litchfield, president, Goodyear Tire & Rubber Co., Akron, Ohio, suggested that there be a revision of the "traditional governmental attitude and machinery in mediating labor disputes" and asked for cooperation between management and labor with labor being made responsible equally with management. At the session on price making in distribution, views were expressed both for and against resale price maintenance such as is proposed in the Miller-Tydings Bill which has been held up at the direct request of President Roosevelt. The session ended Thursday.

Firestone Workers Vote on Pact Proposed by Company

The Firestone Rubber Workers Union deadlock which has existed since March 3 was suddenly broken in Akron April 28 with the announcement that an agreement had been reached as to the degree of union recognition which the company would grant. The pact was submitted to the 10,000 Firestone employes and it was predicted that it would be overwhelmingly ratified and that the Firestone factories would reopen Monday.

The pivotal section of the pact reads: "The company agrees to bargain collectively with the union through its accredited representatives and to meet such representatives to handle and adjust grievances for such of the employes as desire their services. The company recognizes and will not interfere with the right of its employes to become members of the union. Neither the company or any of its agents will exercise discrimination, interference, restraint or coercion against any member of the union on account of such membership."

The Firestone-CIO pact is the first for a major tire company and is expected to set a pattern for the entire rubber and tire industry.

Hudson Introduces Two Types Of Convertible Body Models

The Hudson Motor Car Co. has announced six convertible car models for 1937. Two are Hudson eights, two are six cylinder Hudsons, and the remaining two are offered in the low priced Terraplane line. Two types are being offered. One is the convertible coupe, a three-passenger, one-seat affair, and the other is a convertible brougham. This is a six-passenger, two-door model. A new type of front seat, pivoted at the left end and swinging forward in an arc to provide entrance and exit room for rear seat passengers, is used in the brougham models.

Coyle Elected GM Director

At the annual meeting of the stockholders of General Motors Corp. in Wilmington, Del., April 27, the directors were reelected for the ensuing year. Marvin E. Coyle was elected to replace the late Alfred H. Swayne.

Army Approves New GM Air Engine

1000 hp. V-12 Developed by Allison Engineering Is Cooled by Liquid of High Boiling Point

An Army type-test approval certificate has been granted for the Allison V-1710 aircraft engine, which completed the necessary tests on April 23. This is the first engine to pass the Army 150-hour type test for engines of 1000-hp. and over (normal rating). We understand that intensive development work has been under way at a number of aircraft engine plants for several years past to meet the Army Air Corps requirements and the 150-hour type test for aircraft engines of this class.

The Allison engine is a V-12 with liquid cooling by a high-boiling-point coolant. Ethylene glycol is the coolant used. It has a boiling point of 387 deg. F., and a radiator containing a liquid approaching this temperature naturally dissipates much more heat than one containing water, which boils at 212 deg. F. Consequently, a radiator of much smaller frontal area can be used.

The new engine is said to be specially adapted for high altitude flying, as it permits a very practical installation of a turbo supercharger. Equipped with such a supercharger it maintains its ground level output of 1000 hp. up to an altitude of 25,000 feet. With such a powerplant a plane is capable of very rapid climbing and of very high speeds —two qualities that are valuable in military airplanes. The liquid-cooled engine has a small frontal area, less than 6¼ sq. ft, which is less than 40 per cent that of radial air-cooled engines of smaller output now in use.

The development and construction of this new engine has been under way for almost five years by the Allison Engineering Co. at Indianapolis, a division of General Motors, devoted to development work. The Air Corps Power Plant Section at Wright Field has purchased a number of these engines and carried through the intensive testing of the different designs that led to the engine specification now being released for production.

In addition to the test work carried on in the engine laboratory, Wright Field installed a test engine in an experimental plane. This experimental plane with the Allison engine to date has flown more than 100 hours, with satisfactory performance as to power and smoothness in take-off and in flight, and particularly good starting in cold weather, we are informed. Lieut. B. S. Kelsey of the Flight Section at Wright Field reached an altitude of 26,400 ft. with this plane, which does not have the supercharger.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

A substantial upward movement in general business activity occurred last week. An improved showing was made by the automobile, steel, and bituminous coal industries; and gains were also reported in car loadings, petroleum runs to stills, and lumber cuts. The weekly business index compiled by the *Journal of Commerce* stood at 103, as compared with 99.4 for the preceding week and 89 for the corresponding period last year.

Farm Income Highest Since 1929

The Department of Agriculture has announced that cash farm income last month amounted to $707,000,000, the highest reported for that month since 1929. Of this total, $111,000,000 consisted of benefit payments.

Home Building Gains

In view of the substantial gain in residential building during the first quarter of this year, it is believed in the industry that the total for the entire year 1937 will exceed that for 1930.

Carloadings Increased

Railway freight loadings during the week ended April 17 amounted to 751,328 cars, which marks an increase of 35,284 cars above those in the preceding week, a gain of 109,050 cars above those a year ago, and a rise of 140,187 cars above those two years ago.

Department Store Sales Steady

According to the Board of Governors of the Federal Reserve System, department store sales during March increased by less than the usual seasonal amount. The adjusted index for March stands at 92, as against 95 the month before and 84 a year ago.

Big Gain for Chain Stores

Sales of 28 store chains during March, including two mail order houses, were about 22.7 per cent above those in the corresponding period last year. Sales of these same companies during the first quarter of this year were about 16.6 per cent above those a year ago.

Power Output Higher

Production of electricity by the electric light and power industry in the United States during the week ended April 17 was 12.4 per cent above that in the corresponding period last year.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended April 24 stood at 93.8, as compared with 94.3 the week before and 94.5 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended April 21 showed declines of $3,000,000 in holdings of discounted bills and of $1,000,000 in holdings of bills bought in the open market. Holdings of government securities remained unchanged. Money in circulation increased $5,000,000, and the monetary gold stock was enlarged by $40,000,000.

Canadian Tariff Inquiry Continues Another Year

The Tariff Board at Ottawa, Ont., is continuing its investigation of the automotive industry on which it rendered a report last month. The Canadian board, acting on the Finance Minister's instructions, made an extensive investigation into the automotive schedules of the tariff before the 1936 budget was prepared with the result that a large number of reductions were recommended which that budget put into effect. Following these reductions the board was instructed by Mr. Dunning to continue its observations to ascertain how the lower schedule worked out. The board made these observations during the past year and recommended in last month's report further reductions, which will be moved by the Finance Minister as amendments to the current budget. Extension of the inquiry for another year will give the board an opportunity to examine the workings of the industry under the new conditions and determine if further reductions are desirable.

The government has placed before the House numerous changes in the schedules widening the free list on parts and lowering the tariff on steel of a class or kind not made in Canada and used in automobile construction. In its report to the government, the board suggested that net profits made by Canadian manufacturers of automobiles were out of line with those made by United States manufacturers of similar types of cars. It suggested that the government might take action under powers set out in the Tariff Act to reduce rates by Order-in-Council in cases where it was found that profits were too high in a protected industry. However, the administration has taken no such action and, apparently, adopted the stand that it would be better to observe the operations of the industry for another year under the new rates.

North Atlantic Air Service Being Organized by France

The task of organizing a French air service across the Northern Atlantic has been entrusted by the Air Ministry of the Cie. Générale Transatlantique (the French line) and Air France, both of which concerns are under the financial control of the Government. These two companies have organized a subsidiary to be known as Transatlantique Air France. Trial flights are to be made this year with the rebuilt seaplane, "Lieutenant de Vaisseau Paris," and the Farman "Centaure." They will be continued next year with a new seaplane of the "Lieutenant de Vaisseau Paris" type. For the present it is planned to make direct flights from Brest to New York, which, of course, will limit the carrying capacity.

Thompson Products Acquires Jadson Plant in California

Thompson Products, Inc., Cleveland, has acquired the assets and business of the Jadson Motor Products Co., Bell, Calif., according to an announcement by Fred C. Crawford, president. The California plant gives Thompson Products the advantages of complete manufacturing facilities on the Pacific coast and is expected to improve service to replacement and original equipment customers in the west.

The Jadson company will continue manufacturing and sales activities under its own name. The active managing personnel of Jadson is unchanged, with C. V. Dachetler acting manager and A. E. Robb, vice-president in charge of engineering and sales.

Seven-Passenger Sedan Added to Plymouth Line

A seven-passenger model was added last week to the Plymouth 1937 line and production is already under way with shipments now being made to Plymouth dealers throughout the country. The new seven-passenger model is a four-door touring sedan, with built-in trunk. It has a wheelbase of 132 in. and measures slightly more than 213 in. from bumper to bumper.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

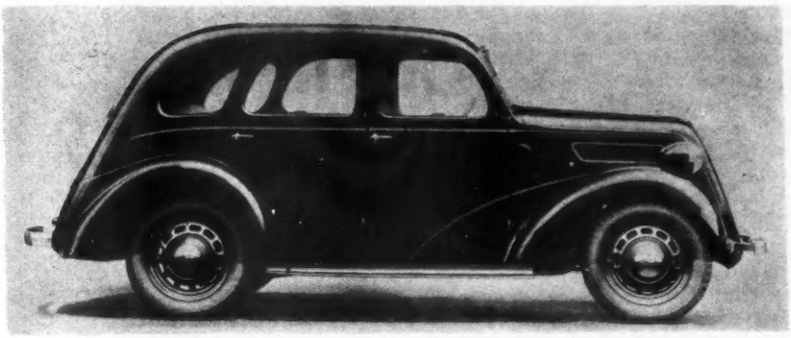
The Prevention of Noise

At last we are beginning to realize that there is a noise nuisance in our modern civilization and a society known as the Society for the Prevention of Noise has been organized in New York to mitigate it. It seems to be accepted, like scores of other nuisances and burdens under which the race groans as a necessary evil due to the multiplied activities of our modern life.

This is only partly true; noises may be generally divided into two classes, useful and pernicious. Under the first class come the various warning signals found necessary for the protection of life in populous centers and which, apparently, must grow in number as population increases and street locomotion keeps pace with its needs.

Of the pernicious noises the horse and the rough pavements provided for him are a most prolific source. The impact of horses' hoofs and the clash and clang of iron tires make up a large part of the disagreeable noises of a great city. Smooth pavements and motor vehicles running upon them will reduce this class of street noises to a minimum.

—From *The Horseless Age*, May, 1897.



The new British Ford "Four-Ten" with four-door body. A two-door, four-window sedan is also offered

Studebaker Appoints Two Assistant Sales Managers

Two appointments to the post of assistant sales manager and five regional appointments were announced last week by Geo. D. Keller, vice-presidnt in charge of sales of the Studebaker Corp. C. S. Fletcher was named assistant sales manager at South Bend, while R. F. Gloster was appointed assistant sales manager with headquarters in New York.

Mr. Fletcher has directed Studebaker sales promotion activities for the past two years, and during his 15 years with the corporation has handled various export assignments in foreign markets, serving at one time as sales manager of the Studebaker Canadian Corp.

Mr. Gloster has also been with Studebaker for 15 years and leaves his post as zone manager of the South Bend branch to take over his new duties in the east.

With the reopening of the Chicago branch, C. H. Monahan takes over its direction as regional manager with L. S. Morrin as assistant regional manager. The South Bend regional post vacated by Mr. Gloster will be filled by S. B. Cochrane. Two new assistant regional managers have been selected for the Philadelphia region, Paul R. Davis operating the territory outside of Philadelphia, and Helm Walker in charge of activities within Philadelphia.

William A. Davidson

William A. Davidson, vice-president and works manager of the Harley Davidson Motor Co., died April 21 in Milwaukee following a recent operation for an infection. He was 63 years old. With his brothers, Walter and Arthur, and William Harley he built the first motorcycle in 1903 and founded the firm that has since become one of the largest of its kind in the world. He is survived by his wife, three daughters and two sons.

Automotive Metal Markets

Steel Buying Falls Back Into Routine as Steady Prices Are Assured for Next Five Months

By William Crawford Hirsch

With the price situation in the steel market definitely cleared up and buyers assured that there will be no advances on steel shipped to them over the next five months, automobile manufacturers and parts makers have resumed their routine method of buying steel as needed. That implies, of course, placing orders for automobile sheets sufficiently far ahead to enable mills to arrange their rolling and finishing schedules in an orderly and economical manner.

Where complaints came from mills a few weeks ago that they were being flooded with business, some of it undeliverable before the late summer, there is now a good deal of fault-finding with automotive consumers who are backward in issuing shipping releases. Backlogs are being worked into at a much higher rate than that of incoming new orders. Some of the steel producers hold that, once they have filled the lower-priced orders remaining on their books, they will be able to make better profits with the lighter pressure on capacity than they would have, had the upturn in buying not been checked as it was through the announcement of no change in prices for the next quarter.

The American Iron and Steel Institute's estimate of another one per cent rise in this week's operating rate was issued before some of the mills in the flood area had to cope with that fresh setback. According to reports on Tuesday the loss in production was slight, but it probably sufficed to offset the gain looked for by the Institute. Anyway the primary motive in pushing output so high at this time is that mills want to complete as quickly as possible shipments due buyers at lower prices, so that they can then operate as economically as possible on the basis of the higher prices. With reports

(Turn to page 677, please)

New British Ford

Chassis and Body Changes Characterize Latest "Four-Ten" Model

The English Ford Motor Co. has announced a new version of the Ten-Four light car that has been sold for the past two years alongside the original 8-hp. model.

In the power unit there are differences of detail only, such as the use of white metal liners for the camshaft bearings and the adoption of a four-point "live" rubber mounting. But elsewhere the new Ten differs extensively from the superseded version. Thus the 94-in. wheelbase is 4 in. longer, though the track (45 in.) remains unchanged; all seating is now within the wheelbase; Girling brakes make their first appearance on a Ford, as do pressed steel (spoked-disk) wheels for the 4.50-in. tires.

The type of springing is in accord with Ford practice hitherto (transverse and inverted half-elliptics), though the front spring has an extra leaf and the shackles have oil-less bushings. The frame has a low center, with a kick-up front and rear and a spring base of 103 in.

Other differences include a new radiator grille, new hood with horizontal louvres at each side, new instrument panel, interior fittings and trimmings, rear compartment for luggage with access from outside by way of a bottom-hinged door, separate locker for the spare wheel below the luggage space, larger battery and gas tank, self-cancelling traffic indicators with steering column control, horizontal hand brake under the instrument panel with pull-on pistol-grip, dual vacuum windshield wipers and combined head and side lights.

Three body styles are being offered, two-door four-window and four-door six-window sedans and an open semi-sport four-seater. The latter also has a luggage locker with drop-down door forming the outswept tail panel. The two sedans list at £150 and £143 respectively, while the open four-seater is £153.

The four-cylinder engine has a bore and stroke of 2.5 x 3.64 in. (71.55 cu. in. displacement) and is rated 10 hp., implying an annual tax of £7 10s.

Alfa Romeo Wins First Two Places in 1000-Mi. Race

Alfa Romeo won the first two places in the annual Italian 1000-mi. road race, Pintacuda and Mambelli averaging 71.3 m.p.h. for the distance. Farina and Meazza were second and Shell and Carriere came in third out of 130 starters on a French Delahaye.

In the smallest car class a four cylinder Fiat of only 31 cu. in. displacement won at an average of 48.5 m.p.h. The route comprised a double crossing of the Appenine Mountains over roads open to normal traffic.

New Unions Compete

(*Continued from page 639*)

or plant executive is eligible for membership in the new union. Dues are set at 50 cents registration fee and 50 cents a month for membership.

At a meeting of the American Labor League in Detroit Sunday, J. E. Perryman, vice-president, said that his organization already had 20 units in Detroit and that the league would go into all fields of industry although for the present it would concentrate on the automotive and steel branches.

In addition to these new organizations and the UAW, there is also the old Mechanics Educational Society which appears to be undergoing rejuvenation, so that four unions are now actively competing for membership among automobile workers, aside from any efforts on the part of the American Federation of Labor.

That the automotive field has not been abandoned by the AFL is seen in a recent exchange of telegrams between Francis J. Dillon and Edsel Ford. Dillon, who was provisional president of the UAW under its probationary period with the Federation and is now an AFL organizer, had wired Ford suggesting negotiations looking toward collective bargaining. Dillon received the following reply: "Thanks for your telegram. While we appreciate your interest there is nothing we can add to what has already been said publicly." Although there was little reassurance in this message, Dillon is quoted as saying that he considered the fact that a reply had been received as indicating that "we have our foot inside the front door."

It is conceivable that this division of labor into several unions will prevent the UAW from having a majority membership in a number of plants thereby losing the exclusive bargaining privilege which the Wagner Act grants to the union representing more than 50 per cent of the employes. In its dispute with GM, the UAW was unwilling to submit to an election to determine representation. With two new unions soliciting membership among GM employes, the UAW's chances would appear to be even less favorable for gaining the exclusive bargaining privilege when its present agreement with the corporation expires. The corporation's pact not to bargain with any other group without Governor Murphy's sanction extends to Aug. 11 although either party can file a request to reopen negotiations for a new agreement at any time after June 11, 60 days' notice of termination of the agreement being required.

Under the direction of Frank H. Bowen, regional director, the National Labor Relations Board set up 20 polling places at the Packard plant, each with a teller appointed by the board and an observer or challenger for the company and for the union to pass on the eligibility of the voters. Voting was secret. The ballot asked the single question of whether the employe wanted the UAW to represent him as sole bargainer with the management.

The first clash between the newly formed American Labor League and the UAW occurred in Saginaw on Monday when the UAW attempted to close the plant of the Baker-Perkins Co., manufacturers of baking and confectionery machinery. The UAW claims that picketing of the plant was in protest of the discharge last week of 60 union employes for an attempt to stage a sitdown strike for increased wages. But police said they were told that the picketing was the outcome of rivalry between the unions, more than half of the plant's 500 workers having joined the American Labor League. To reinforce their picket lines, UAW leaders called out 225 workers of the strongly organized Nelson Brothers Foundry,

Pictures, Inc., photo

This battery of loudspeakers mounted in an airplane will carry the voices of UAW organizers from the skies to workers at the Ford River Rouge plant.

forcing the closing of the plant. An additional 200 workers at the steering gear division of GM also responded to the call for aid, forcing the temporary closing of that plant. Operations at the GM plant were resumed with the afternoon shift.

The fourth sitdown strike in a Ford plant closed the Richmond, Calif., assembly branch on Friday last week. It was called because of alleged discrimination against 12 men transferred from the assembly plant to the loading department. After occupying the plant for 11 hours, several hundred strikers evacuated it early Saturday morning when advised that a Ford official and Ed Hall, UAW vice-president, were flying to Richmond and that the dispute would be negotiated. The plant reopened Monday with the union claiming victory. But Harry Bennett, personnel director of Ford Motor Co., replying to a statement attributed to Ed Hall, in which he declared that Henry Ford is dealing with the union every day, said: "Henry Ford is not dealing with the union and Hall knows it. Hall denied to me that he had made the statement." Bennett had told Hall over the telephone when the strike started Friday that "if the plant isn't open on Monday it never will open again."

The trial of 120 employes arrested for contempt of court during the eviction riot at the Yale & Towne Manufacturing Co. plant April 14, was started before Judge Arthur Webster in Circuit Court Monday.

Detroit police evicted 250 sitdown strikers from the plants of Parke Davis & Co., manufacturers of pharmaceutical products, Monday, aided by Federal officers interested in a $2,000,000 inventory of drugs under direct supervision of the U. S. Treasury. Federal narcotic agents are investigating if any drugs are missing from the narcotic department from which strikers were dislodged.

"Strikes Over"—Martin

"In my opinion the major automobile strikes are over," said Homer Martin, president of the United Automobile Workers union, in South Bend this week to confer with labor leaders. "The battle for labor is definitely triumphing. The United Automobile Workers organization has made more progress than any other trade union in the same length of time in American history. In less than six months our membership has grown from 30,000 to 300,000. Our problem now is to consolidate our gains by establishing our unions upon a responsible basis."

Regarding the Ford situation Martin said: "I believe we shall have very little trouble with Mr. Ford. We are already conducting negotiations with his representatives. I have not conferred with Ford. The people of Canada are friendly to the CIO and I think that the Canadian situation is now well under control."

In commenting on the progress of his organization Martin said that reduction in working hours has always been a chief concern of labor organizations and was especially of interest to his group. "We will continue our fight for it."

Hupp Officials Appointed

W. A. MacDonald has been appointed vice-president and director of sales, and Frank E. Watts, vice-president and chief engineer of Hupp Motor Car Corp. McDonald originally entered the automobile business with Hupp, later becoming associated with other automobile and aircraft companies in sales executive positions. He rejoined Hupp in 1935. Watts has been Hupp's chief engineer for the past 20 years and has been with the company since 1910.

Chrysler Earns $2.51

First Quarter Profit Off Only Slightly from Strike

The Chrysler Corp. reports first quarter earnings of $10,914,303, equivalent to $2.51 per share of common stock. This compares with a net profit of $11,453,439 in the corresponding period last year. A dividend of $2 per share was declared on the common stock.

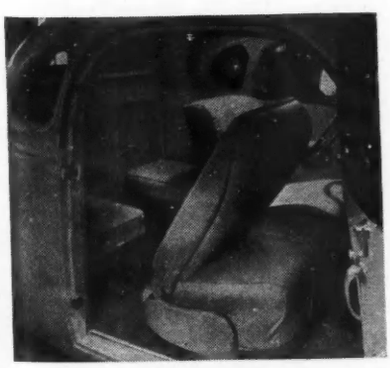
The decline in earnings was attributed to the prolonged closing of Chrysler plants by strikes during March.

:SLANTS:

BASKET BALL CHAMPIONS—*Employes of the Young Radiator Co., Racine, Wis., are celebrating the victory of their basket ball team which won the 1936-37 championship in the Racine Major League. Racine is proud of its basket ball league, backed by manufacturers of the city, and first place was as usual keenly fought for this year.*

KENILWORTH CASTLE — *Historic Kenilworth Castle, familiar to every schoolboy from his reading of Sir Walter Scott's "Kenilworth," has become the property of the British people, thanks to the generosity of an automobile and aircraft manufacturer, Sir John Davenport Siddeley, who recently purchased the ruin and gave it to the nation. Sir John has also placed a sum at the disposal of the Office of Works, custodian of the relic, to permit urgent repairs.*

OLDS' OLDEST—*The oldest employe in the oldest unit of the U. S. automotive industry — Oldsmobile — has just celebrated his 90th birthday. He is Michael James Murray, whose last 19 years have been spent with Oldsmobile —the second of the only two jobs he has ever had. His first job, 45 years with the Michigan Central Railroad, would have been a lifetime's work for the average man. Born in 1847, he has seen Michigan grow from a frontier country where there were three Indians to every white man, to its present highly industrialized state.*



Arrangement of the two auxiliary seats in the Nash-Lafayette "all-purpose" coupe is shown above.

General Motors Bettered Safety Records in March

The best March safety record in the history of General Motors was achieved this year, according to tabulations compiled by C. E. Wilson, vice-president, from 75 plants in the United States and Canada.

In the face of an increase in the number of hours worked in comparison with March, 1936, there were fewer days lost because of injuries. The frequency of accidents was the lowest for any month in the corporation's history. In accounting for this record, Mr. Wilson pointed out that the entire General Motors foreman organization is enrolled in a contest sponsored by Alfred P. Sloan, Jr., president of General Motors, which is designed to eliminate the causes of accidents. The Sloan Award Campaign, which started Dec. 1, 1936, and continues to June 30, 1937, has resulted in a steady safety improvement.

Field Stocks Are Low

(Continued from page 639)

cent. Domestic demand took over 92 per cent of the industry's entire production of 518,715 vehicles last month in the U. S. and Canada.

The used car situation is not expected to be a problem this season. With a record March volume of new car sales, used car stocks are estimated to have increased only a little more than five per cent during the month to a level about 15 per cent higher than a year ago. But demand is also better than it was last year and the vehicles are moving at a good rate. Stocks now are believed to be about as high as they will get this season since May and June are the big sales months for used cars.

Domestic retail deliveries of Buick motor cars during the second 10 days of April totaled 7214 units compared with 7499 in the first 10 days of the month and 5842 in the corresponding period of April a year ago. Unfilled retail orders stood at 21,457 on April 20 as against 20,942 ten days earlier and 19,488 on March 31.

Motor Wheel Reaches Agreement with UAW

An agreement between the Motor Wheel Corp. and the United Automobile Workers was signed here this week. The pact with the union provides for a 70 cent hourly minimum wage for men and 65 cents for women during the first 90 days of service, and a minimum five cents higher for both after 90 days. All day work rates and piece work rates will be increased five cents an hour. The corporation recognizes the UAW for its members in collective bargaining and also agrees not to aid, promote or finance any group for the purpose of collective bargaining.

Motor Wheel officials and union leaders have been negotiating for several weeks.

HOWARD F. ROUGH, of California, former Department of Commerce inspector and supervising aeronautical inspector, has been appointed to the post of assistant director of the Bureau of Air Commerce.

HARRY L. SHAW, who has been Los Angeles zone service and mechanical manager with Chevrolet, has been appointed central office service development manager.

DAN R. COURTNEY, who began his selling career 20 years ago under Thomas J. Doyle, Detroit's oldest Dodge dealer, heads the Dan R. Courtney Co. which has just been appointed Dodge dealer for Detroit.

LOUIS M. CHALLIS has been named personnel director of the Covered Wagon Co., Mt. Clemens, Mich., trailer coach manufacturers. Mr. Challis is widely known in automotive plant personnel circles, having been with Hudson and Chrysler in similar capacities.

J. T. McFARLAND, for the past 18 years associated with the Worthington Pump & Machinery Corp. in various engineering capacities, has been appointed sales manager of the natural gas engine division of the Lycoming Manufacturing Co., Williamsport, Pa.

Timken-UAW Agreement Allows Paid Vacations

An agreement has been signed between the Timken-Detroit Axle Co. and the UAW, which provides for vacations of one week with pay for all production workers who have been on payrolls a year or more by June 1. It supplements an agreement reached March 7 which setteled a 10-day strike and which established minimum wage rates and sole bargaining rights for the UAW.

The agreement extends the March 7 pact to Dec. 31, 1937, unless union employees of the company reject this date at a ratification meeting. The original six-month agreement would have expired Sept. 6.

In addition to the March 7 provisions it provides a 44-hour week with time and a half for more than eight hours in any one day; five per cent preferential pay increase to night workers after June 1; two 15-minute rest periods for women each day; seniority after 60 days' employment, except in special cases; recognition of the shop steward system; a pledge by the union not to halt operations until an "earnest effort" at settlement has been made through the channels provided; and a 10 per cent increase in piece work and base rates beginning May 1. Approximately 2200 employes are affected.

March Passenger Car Sales 365,000, Polk Estimates

With new passenger car sales for March ranking 75.48 per cent higher than February and 23.78 per cent higher than March a year ago on the basis of reports from 37 states, R. L. Polk & Co. adds 22,000 to bring its March sales estimate to 365,000 for the United States.

Sales to date in 37 states total 246,538. This compares to 214,973 sales for the entire United States in February and to 199,173 sales in March, 1936, for 37 states.

A similar situation exists in truck and commercial car sales. Where the original Polk estimate of sales was placed at 52,000 for March, it has been found necessary to increase that figure to 60,000. Truck sales to date in 37 states total 41,347 which is 46.47 per cent ahead of February and 12.61 per cent higher than March a year ago. Total February truck sales in the United States were 41,815, while in March 1936 the total was 52,428.

General Motors Export Sales Reach New First Quarter High

Sales of General Motors cars and trucks to dealers in the overseas markets during March totaled 32,172 units, representing a decrease of 1.9 per cent from the figure of March of last year.

In the first quarter of 1937, sales of 86,657 represented an all-time high first quarter volume, and an increase of 0.4 per cent over the volume in the first quarter of 1936. For the 12 months through March, 1937, sales totaled 325,124 units—an increase of 7.9 per cent over the volume in the 12 months ended March 31, 1936.

These figures include the products of the corporation's American, Canadian, English, and German factories sold outside of the United States and Canada.

The "1937 Laws Bulletin," a digest of new **legislation affecting highway users,** has been issued by the National Highway Users Conference, Washington, D. C.

The National Lubricating Grease Institute, Cleveland, Ohio, has brought out the first issue of its publication, *"The Institute Spokesman."*

The Gisholt Machine Co., Madison, Wis., has announced a new catalog illustrating standard **small tools** for its Nos. 3, 4 and 5 ram type universal turret lathes.*

A new technical bulletin, in two sections, has been issued by Acheson Colloids Corp., Port Huron, Mich. The first section, A260, deals with the subject of impregnation with "dag" **colloidal graphite** from the theoretical standpoint, while B260 treats of the practical aspects of this particular application.*

Federal Motor Truck Co., Detroit, Mich., has prepared a rather elaborate brochure entitled **"Twenty-five Years of Federal Trucks"** which describes the development of the company.

A new catalog entitled **"Modern Cornell Doors, Upward Acting,"** has been issued by the Cornell Iron Works, Inc., Long Island City, N. Y.*

C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., recently published a catalog covering its line of **pyrometers.** Several new instrument developments are described, including a high-speed photoelectrically balanced multipoint recorder.*

A recent publication, "Electric Heating Units and Devices," gives information on a number of **small heating units** made by the General Electric Co., Schenectady, N. Y.*

An article entitled **"The Systems Tin-Germanium and Tin-Beryllium"** by Prof. Dr. W. Guertler and M. Pirani has been published in pamphlet form by the International Tin Research and Development Council, London, England.

"Laboratory Microscopes and Accessories," a catalog describing the products of Bausch & Lomb Optical Co., Rochester, N. Y., was recently issued by that company.*

Cost and production figures on different types of **threading and tapping** operations performed by Landis equipment are presented in unique form in the Check Book prepared by the Landis Machine Co., Waynesboro, Pa.*

A bulletin describing the **precious metals** refining service offered by Handy & Harman, Bridgeport, Conn., has been issued by that company.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Calendar of Coming Events

SHOWS

Norway, Automobile Salon—Oslo..May 7-10
Second Annual Automobile Maintenance Show, San Francisco.....May 20-23
Morocco, Automobile Section, Tangier Fair, Tangier .....June
France, Automobile Section, Bordeaux Fair, Bordeaux .....June 13-28
Belgium, First International Aeronautical Salon, Brussels.....June 18-30
Fourth ASTM Exhibit of Testing Apparatus and Related Equipment, New York .....June 28-July 2
Poland, Automobile Salon (Foire Orientale), Lwow .....Sept. 1-15
France, 31st International Automobile Salon, Paris .....Oct. 7-17
Great Britain, 31st International Automobile Exposition, London....Oct. 14-23
Czechoslovakian Automobile Show, Prague .....Oct. 16-24
National Automobile Show, New York, Oct. 27-Nov. 3
Italy, 10th International Automobile Salon, Milan .....Oct. 28-Nov. 8
Buffalo, N. Y., Automobile Show, Oct. 30-Nov. 6
Cincinnati Automobile Show.Oct. 31-Nov. 6
Great Britain, 13th International Commercial Automobile Exposition (trucks and buses), London...Nov. 4-13
Chicago Automobile Show.....Nov. 6-13
Akron Automobile Show.....Nov. 6-12
Omaha Automobile Show.....Nov. 6-11
Brooklyn Automobile Show.....Nov. 6-13
Columbus Automobile Show.....Nov. 6-13
Detroit Automobile Show.....Nov. 6-13
Kansas City, Mo., Automobile Show, Nov. 6-13
Motor Truck Show, 4th Annual, Newark, N. J.....Nov. 6-12
Newark, N. J., Automobile Show..Nov. 6-13
Philadelphia Automobile Show....Nov. 6-13
Pittsburgh, Pa., Automobile Show.Nov. 6-13
Toronto, Ont., Automobile Show..Nov. 6-13

Show Business

Manager of the National Automobile Show in New York is Alfred Reeves, 366 Madison Ave., N. Y. C. Inquiries concerning all matters connected with the national show should be addressed to him. AUTOMOTIVE INDUSTRIES will be pleased to furnish names and addresses of local show managers on request.

Great Britain, 36th Scottish International Automobile Exposition, Glasgow .....Nov. 12-20
Baltimore, Md., Automobile Show, Nov. 13-20
Cleveland, Ohio, Automobile Show, Nov. 13-20
Jersey City, N. J., Automobile Show, Nov. 13-20
Milwaukee, Wis., Automobile Show, Nov. 13-20
Springfield, Mass., Automobile Show, Nov. 14-20
St. Louis, Mo., Automobile Show.Nov. 14-21

CONTESTS

Indianapolis Speedway, 500-Mile International Sweepstakes .....May 31
31st Annual Grand Prix of the Automobile Club of France, Linas-Montlhéry .....July 4
Pan American Cup Race, Roosevelt Raceway .....July 5
National and International Soap Box Derby Finals, Akron, Ohio.....Aug. 15
Roosevelt Raceway, 400-Mile George Vanderbilt Cup Sweepstakes....Sept. 6
National Outboard Championship Regattas, Richmond, Va.....Sept. 18-19

CONVENTIONS AND MEETINGS

National Machine Tool Builders' Association, Spring Convention, Edgewater Beach Hotel, Chicago....May 3-4
41st Annual Convention and Exposition of the American Foundrymen's Association, Milwaukee .....May 3-7
S.A.E. Summer Meeting, White Sulphur Springs, W. Va.....May 4-9
National Battery Manufacturers Asso., Spring Convention, Shoreham Hotel, Washington, D. C.....May 13-14
American Society of Mechanical Engineers, spring convention, Detroit, May 17-21
National Association of Purchasing Agents, 22nd Annual Convention, William Penn Hotel, Pittsburgh, Pa. .....May 24-27
American Petroleum Institute, Mid-Year Meeting, Colorado Springs, Colo. .....June 1-3
Second World Petroleum Congress, Paris, France .....June 14-19
Automotive Engine Rebuilders Association, 15th Annual Convention, Chicago .....June 21-24
American Society for Testing Materials, 40th Annual Meeting, New York, June 28-July 2
American Transit Association, 56th Annual Convention, White Sulphur Springs, W. Va.....Sept. 19-23
S.A.E. Fuels and Lubricants Regional Meeting, Tulsa, Okla. ...Sept. 30-Oct. 1
S.A.E. National Aircraft Production Meeting, Los Angeles, Calif.....Oct. 7-9
S.A.E. Annual Dinner, Commodore Hotel, New York.....Oct. 28
American Petroleum Institute, 18th Annual Meeting, Stevens Hotel, Chicago .....Nov. 9-12
S.A.E. National Production Meeting, Flint, Mich. .....Dec. 8-10

Just Among Ourselves

An Account of No Account Or—

THIS is a period during which depreciation policies of many manufacturers are in a shifting state due to changes in Federal and State tax programs, and other factors which have spotlighted the depreciation account.

Many depreciation accounts for manufacturing facilities, it must be noted sadly, are just accounts on the books. Definite amounts are charged off to them, but the funds which these accounts represent are not segregated. When the useful life of a piece of equipment ends it is found that its replacement cost is represented as an amount in the books, but not in the bank.

How much better it would seem to work if depreciation accounts were segregated and perhaps even made to grow, by investing the charged-off amounts in securities which were flexible as to conversion, provided with a ready market, and carried a guaranteed final redemption value. Such a program would provide at least a partial hedge against rising equipment prices.

State Control of Used Car Allowances

A SMALL group of Pennsylvania automobile dealers is sponsoring actively, most dealers in Pennsylvania seem willing to support, a bill in the Pennsylvania legislature which seeks to set up commonwealth mechanism to control allowances on used-car trade-ins and other sore spots in the automotive anatomy.

Our interest in the matter springs from two causes. First, because the bill has come up within our bailiwick, where we can study it *in situ*, and get a better than casual perspective on the conditions surrounding its birth. Second, because the bill, by implication and specific intention, is symptomatic of similar legislation which is being talked about by dealers in other States than ours.

In essence, the bill would provide for a commonwealth commission through which automobile dealers and salesmen would be licensed, and which would have the power to license and examine State appraisers of used cars to be traded for new ones. The commission would compile and circulate a schedule of maximum trade-in allowances, and would require the State appraisers to report in detail on every appraisal made, including the condition of the car from the standpoints of safety and resale.

Work of the commission would be financed from the special license fees, and from the sale of report forms to State appraisers of used cars. Intending buyers of new cars would pay $1.50 for each appraisal of the car to be traded, and would have one appraisal fee refunded at the time of completing a deal. Appraisers would be paid by dealers, and could be the dealer himself or a member of his staff, provided a license (requiring at least five years of retail automobile experience, and a "moral" bond to indemnify falsification of statements in the appraisal reports) were obtained.

The bill we are discussing is on all counts the most drastic which has arisen from the scattered wreckage of the NRA codes as they applied to motor-vehicle retailing. As a price-fixing measure, its proponents base their belief in its constitutionality on a Pennsylvania milk-control statute which has weathered court tests.

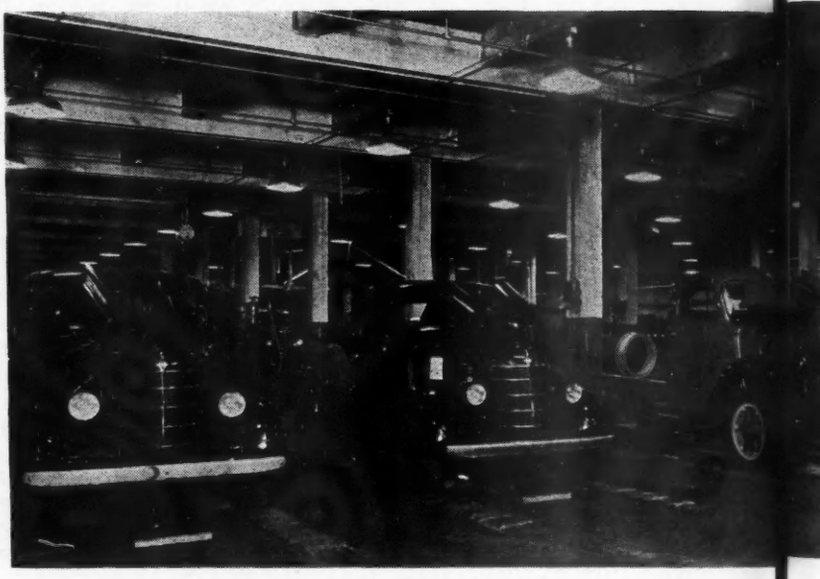
Back of the bill is the tendency among motor-vehicle dealers to look to legislation to settle problems which they are unwilling or incapable of settling among themselves. But in order to achieve whatever benefit can be gained for dealers by legislative control, it is necessary to clothe the automobile retailing business with the legal fiction that control is "in the public interest." If such a bill goes to the courts, and is held constitutional, it may pave the way for some other forms of legislative control which will benefit no one except those who draw salaries for administering it.

Experience on the Wisconsin dealer licensing bill is not old enough for a definitive opinion on its success from the standpoint of the dealer. But it is old enough to have sired sentiment for such bills in other States. New York may be next lying-in hospital for the idea.—H. H.

THIS IS THE THIRTEENTH IN THE SERIES OF MONTHLY PRODUCTION FEATURES.

Coming off the line at Springfield. One of the three main assembly lines stretching as far as the eye can see in the background.

Rarin' to go—tied down on the seven chassis rolls serving the three lines at Springfield.



WHEN the International Harvester Co. announced its revolutionary new "D" line of streamlined trucks on April 1, it set into motion the greatest modernization program in the company's history. Colorful, pleasing lines of the product in keeping with the utilitarian purpose of a heavy-duty motor truck; new and bigger engines; greatly improved performance; and an increasing variety of optional packages—all these were provided to give greater value than ever before. And the manufacturing divisions were groomed to provide adequate line facilities capable of the most economical set-up known in the field.

The anticipated volume of sales justified the utilization of the most advanced ideas in plant layout of materials handling, and production equipment. In fact, we were amazed to find that the new machinery is of precisely the same character as will be seen today in any of the most advanced automobile plants.

With production running smoothly, as it is now, the visitor will find the assembly lines, paint shops, and machine shops reminiscent of any great automobile plant—a far cry from even the expert's idea of a heavy-duty truck operation.

Here will be found some impressive conveyor lines of many types, including three parallel rows of assembly conveyors, each running over 1400 ft. of straight length—constituting perhaps the longest lines of their type in the industry. One of the plants—the Springfield Works—has 5½ miles of various types of conveyors and almost 9 miles of chain conveyors, in addition.

For the new "D" line, IHC builds practically all of its own engines, transmissions, front and rear axles, and other parts. And in Springfield there is

Looking down one of the two assembly lines at Fort Wayne. This is the chassis assembly on the big jobs. Note stock storage at the sides.

IHC Truck Plant

Has production line set up to economically meet rigid requirements of many models

By Joseph Geschelin

a new body plant with sufficient capacity to produce the entire requirements of all-steel cabs, panel bodies, pick-up bodies, and other sheet metal. One of the show places in the body plant is the paint shop which is fitted with the latest type of Dry-Sys enameling equipment.

Manufacturing operations, in the main, are spread over three big plants, assembly operations being concentrated in two of these. The press and body shops serving both assembly plants are located in Springfield, the latter also serving as the assembly depot for the small-tonnage, large production truck models. The Fort Wayne works builds the heavy-duty trucks, and all special specification trucks. This plant is the metal cutting division of the group, producing all of the large engines for its own use; transmissions; front and rear axles, and other parts used here and in Springfield.

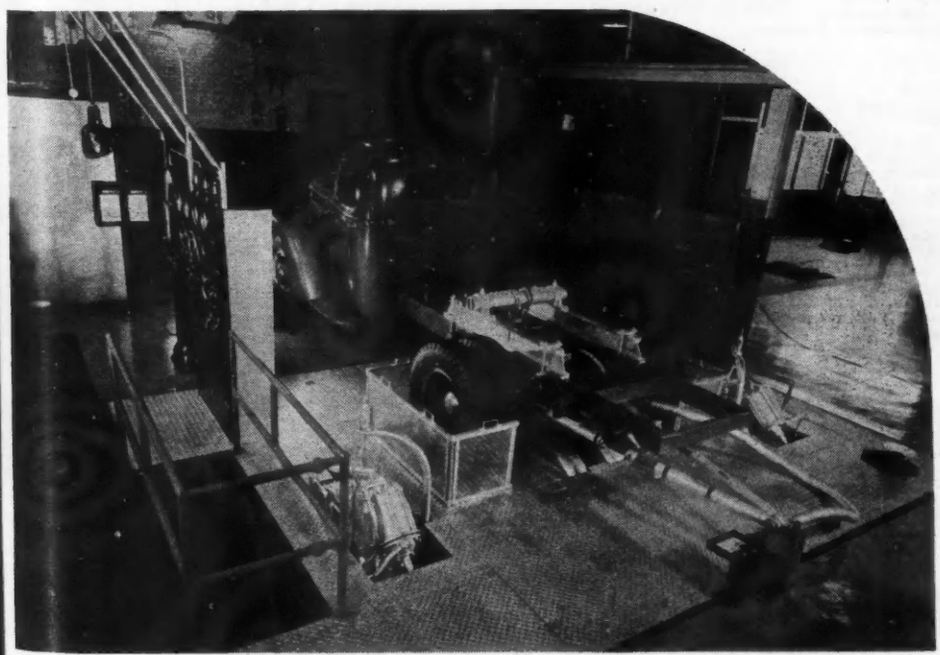
Fort Wayne boasts a large forge shop which makes most of the IHC forgings; a big heat treating department; and a service parts depot which is an institution in its own right.

The smaller sized engines required for the units built at Springfield are manufactured at the Rock Island engine plant of IHC.

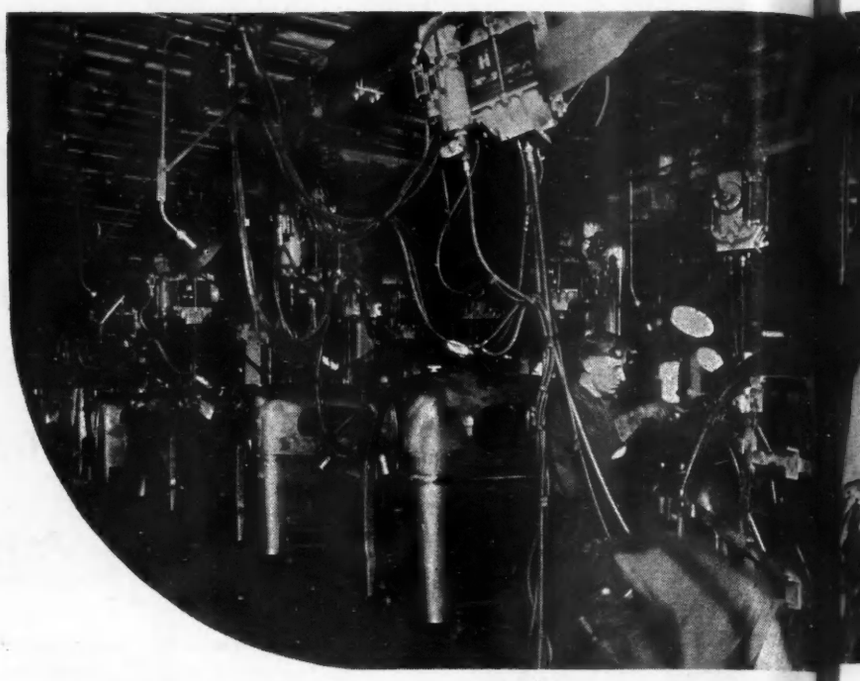
It may be readily appreciated that with such widespread activity some means must be provided for close contact and cooperation between the engineering department and the manufacturing establishments. This is achieved by operating the truck engineering department at Fort Wayne with resident engineer-contact men at Rock Island and Springfield. These men keep in constant touch with Fort Wayne and serve as the liaison between engineering and factory management of the plants in which they are posted.

It is a general practice in the automotive industry for the sales department to provide the basis for the general building schedules. But IHC goes a step further to vest complete control of all line scheduling details in the sales department. This is done through a sales department representative stationed at Fort Wayne who, through an arrangement with the production department, acts as director of plant scheduling in its every detail.

The virtues of this unique



This special chassis dynamometer with its recording instruments played a big role in the development of units for the 1937 line. It was designed by Fort Wayne engineers and built by the plant engineering department. The air cylinders controlling the huge Prony brakes may be seen on each side of the machine.



All-steel cabs, standard on the 1937 IHC line, are welded on the assembly line shown here. Note the door-opening fixture in the foreground and windshield fixture two stations down. Portable resistance welders may be seen suspended overhead. (Springfield)

set-up may be appreciated when it is considered that the individual requirements of truck users impose a staggering total of specification options—running at times into the hundreds of thousands — which, nevertheless, must be handled in an orderly and economical fashion in the day's work. Consider, for example, that in the 1937 line, IHC offers 31 distinct truck models in combination with 85 standard wheelbase options. Then add to this, 11 distinct sizes of engines, including two fours and one six of L-head design, the rest being overhead valve types.

The foregoing are the "standard" variations not including axle, transmission, clutch, and brake options. We must consider, in addition, the choice of color combinations without extra cost, and a variety of other standard packages as well as the gamut of extras.

Through sales department control, the situation is always in hand. In the first place, only actual orders for trucks enter into the schedule at any time. Then each order, with its special options, is closely scheduled and timed for definite, dated delivery.

This scheduling problem is so closely akin to that of any large automobile plant that very similar methods of control are used, including telautograph stations for every assembly activity.

Since IHC is a world-wide organization manufacturing a variety of products, the control of manufacturing operations must be handled in a rather comprehensive manner. Thus we find a central staff in Chicago which directs the activity of all plants. Then, in the case of the truck division, we find that each plant has its own manufacturing executive personnel operating independently under the direction of the central staff. The complete set-up for the truck division will be found in a table reproduced elsewhere in this article.

Finally, in this brief high-spotting we wish to mention something of the essence of the quality control exercised in the manufacture of IHC trucks. There is, of course, the gamut of inspection controls throughout the various production operations. But, in addition, there are several devices of outstanding merit. First is the special chassis dynamometer which was designed and built by the engineering department. With suitable instrumentation, including recording instruments, the machine makes it possible to subject practically every unit of the vehicle to controlled test conditions simulating the most adverse service conditions.

The machine was designed originally for fundamental research but it was inevitable that it would be impressed for certain production testing and it is now contemplated to undertake the building of a new machine exclusively for production testing.

The second exceptional control quality device is the sampling inspection of complete units at Fort Wayne. Inspectors select complete units such as an engine, transmission, or axle, directly off the assembly line and have it transported to the inspection room for checking. The unit is completely disassembled and each element is checked

Executive Personnel

Chicago Central Office

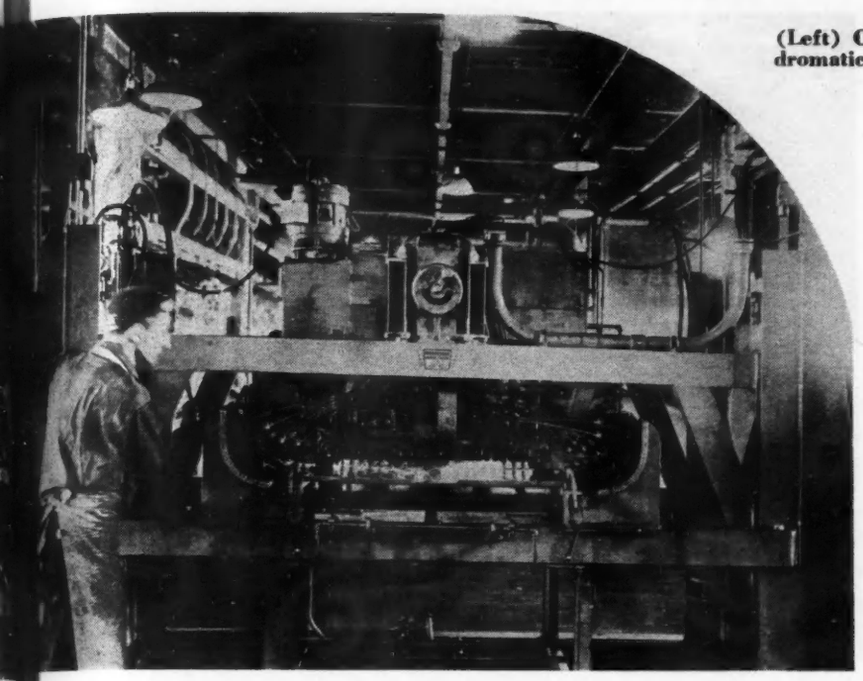
C. R. McDonald ....Vice-President
J. M. Ballentine ...Manager of Manufacturing
A. W. Seacord ....Works Manager, Automotive
K. O. Schreiber ...Assistant Works Manager, Trucks

Fort Wayne Works

C. M. Harrison ....Superintendent
H. A. Weissbrodt .Assistant Superintendent
V. A. Guebard ....Master Mechanic
W. A. Salzmann ...Plant Engineer
J. Obernesser .....Production Supervisor
P. L. Hameetman .Sales and Distribution
D. A. Conroy .....Chief Storekeeper
A. Krieg .....Chief Engineer
A. F. Haeger .....Auditor
J. W. Wynn .....Rates and Methods Supervisor
C. J. Ruckel .....Service and Parts Manager
L. Emley .....Motor Division General Foreman
A. W. Scherer ....Axle and Transmission General Foreman
J. Evans .....Final Assembly General Foreman
G. A. Wallace .....Forge Shop General Foreman
J. F. Clark .....Chief Metallurgist
L. F. Clark .....Chief Inspector

Springfield Works

R. M. Watkins .....Superintendent
I. W. Davies .....Assistant Superintendent
S. A. Young .....Production Manager
H. H. Stephenson..Storekeeper
R. M. Erickson ...Truck Distribution
A. E. Turnbull .....Plant Engineer
H. B. Rose .....Plant Planning and Consulting Engineer
Robert Urich .....Resident Product Engineer
C. N. Godschall ...Tool Engineer
A. L. Veirling ....Auditor
P. P. Rightmyer ..Time Study
C. M. Brodbeck ...Acting Chief Inspector
C. Stites .....General Foreman Body Shop
K. Stephens .....General Foreman Sheet Metal
R. Mason .....General Foreman Assembly



(Left) One of the Progressive Hydromatic welders used on the all-steel cab.

against a blue print. This random sampling affords an excellent spot check on the work in process.

In this presentation we are interested primarily in the operation of the two truck plants—the Springfield works and Fort Wayne works. In the succeeding pages we shall treat each plant individually and again will resort to a quick high-spotting of their most interesting points.

Springfield Works

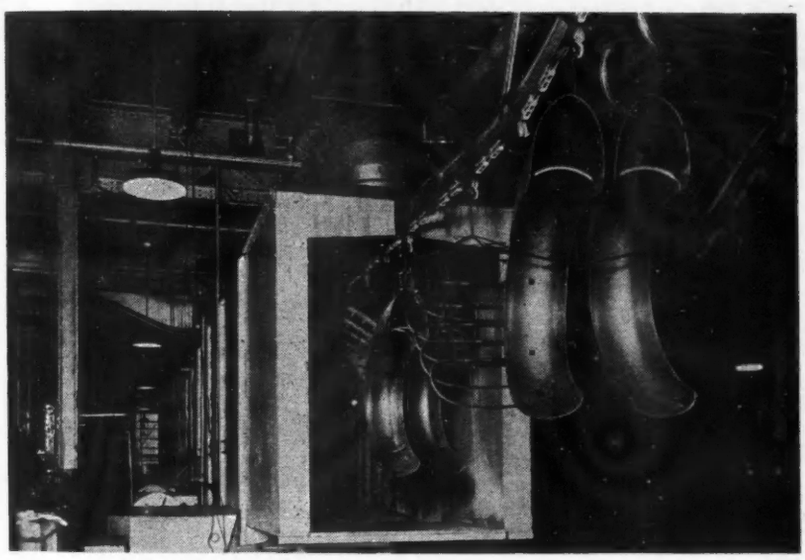
The Springfield plant which has a floor space of 1,290,654 sq. ft. is newly built up, in the main, to accommodate the assembly of at least 450 trucks in an 8-hour shift.

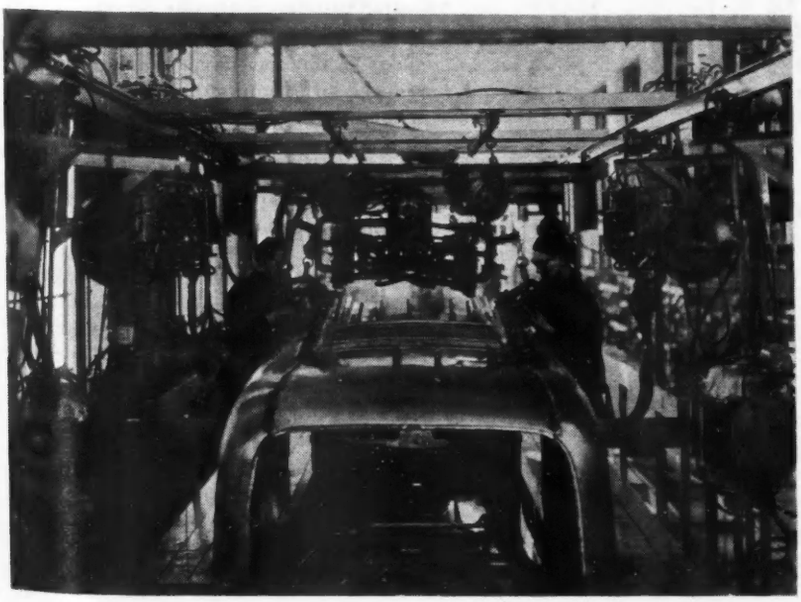
The modernization program involved a neat problem of engineering planning when you consider that they started with a conglomeration of very old factory buildings located in various dispositions on a triangular property, traversed near one end by a sizable and active creek. Today, the visitor will find the new assembly building spanning a length of 1570 ft. along one boundary of the plot, part of the building extending across the creek with a cantilever bridge span of 125 ft. Then there is the new press shop on one side of the creek, communicating with the new paint shop on the opposite side of the creek by means of two conveyor bridges.

Some of the older buildings, including a complete and sizable malleable iron foundry, remain comparatively unchanged in the midst of change. However, it is not unlikely that, eventually, the older buildings will give way to new structures fitting into a program of progressive improvement.

The conveyor data given in tabular form elsewhere in the article gives some impression of the miles of space spanned by mechanical handling devices. The longest of these—the painted sheet metal feeder conveyor has a length of 3330 ft., traversing the paint shop, the covered bridge to the assembly building, and finally delivering its burden to the assembly line stations.

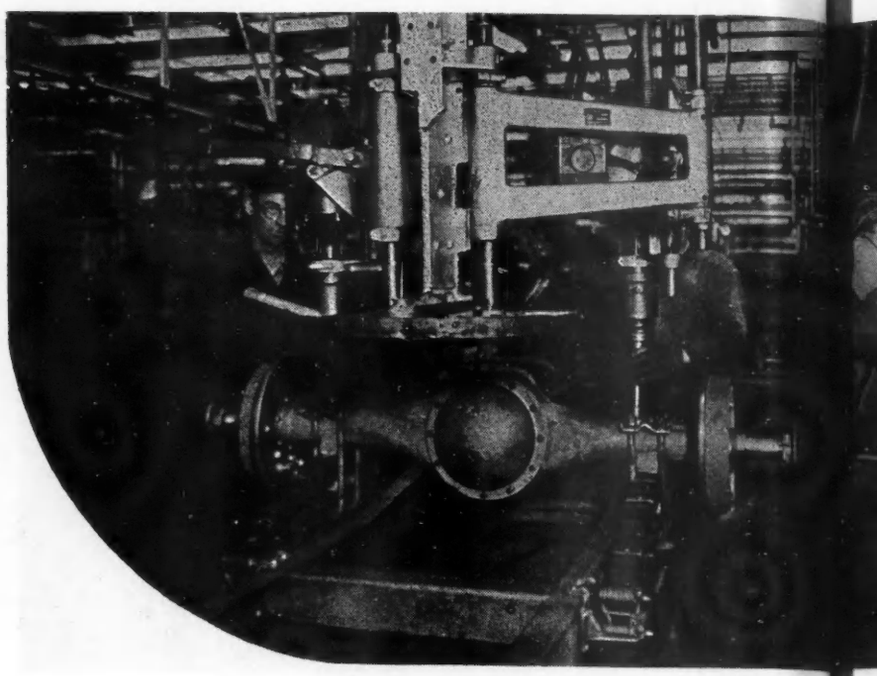
The plant produces light-duty trucks with engines ranging from 133 cu. in. to 232 cu. in displacement.





(Center) The gamut of sheet metal parts used in IHC production come through this huge three-stage Blakeslee washing machine in preparation for finishing. The overhead conveyor bends to the right as it leaves the washer, carrying the parts through the Mahon drying oven.

(Below) Pinch gun welders are used on the panel body.



Interesting spot on Springfield lines is this ceiling-mounted fixture supporting Black & Decker radial arms and electric tools for rear axle fastenings.

Press Shop

Practically all of the stampings required for cabs, panels, and sheet metal parts for Springfield and Fort Wayne are made in the Springfield press shop. This is a modern, high-ceilinged structure with a large proportion of window area to provide a maximum of daylight. The arrangement of equipment and operations is such as to provide a straight, continuous flow of materials from the receiving dock to the paint shop.

In the arrangement of equipment, large presses are in the first group, then come the smaller presses, and finally the various stages of metal finish and assembly. Eleven of the largest presses include Toledo and Bliss equipment, both single and double-acting, and ranging in capacity from 215 to 550 tons. All of the new presses are fitted with the built-in Farval automatic lubrication system.

The press shop is completely conveyorized and all conveyors are protected by suitable guards to promote safety. All sheet metal parts made in the press shop are delivered to the parts paint and body assembly by trolley conveyors.

Conveyor Data

Springfield Works

Description and Type	Length (Ft.)
Cab Trim Conveyor—Floor	932
Panel Body Trim Conveyor—Floor	778
Body Paint Conveyor—Floor	2325
Chassis Sheet Metal Paint Conveyor—Trolley	2100
Cab Assembly Conveyor—Floor	460
Panel Body Building Conveyor—Floor	586
Painted Sheet Metal Feeder Conveyor—Trolley	3330
Wheel Transfer Conveyor—Trolley	680
Tire Storage and Feeder Conveyor—Trolley	1800
Finished Sheet Metal Conveyor—Trolley	2260
Body Sheet Metal Conveyor—Trolley	2250
Enamel Oven Conveyor—Cross Bar	660
Cab Back and Panel Elevator—Cross Bar	71
Sheet Metal Washer Conveyor—Trolley	910
Sheet Metal Prime Conveyor—Trolley	400
Pick-up Body Conveyor—Trolley	520
D-2 Chassis Assembly Conveyor—Floor	1187
D-2 Chassis Assembly Apron Conveyor—Floor	207
D-30 Chassis Assembly Conveyor—Floor	1187
D-30 Chassis Assembly Apron Conveyor—Floor	207
Special Chassis Assembly Conveyor—Floor	1187
Special Chassis Assembly Apron Conveyor—Floor	207
D-2 Motor Assembly Conveyor—Floor	68
D-30 Motor Assembly Conveyor—Floor	68
D-2 Motor Feeder Conveyor—Trolley	218
D-30 Motor Feeder Conveyor—Trolley	288
Special Motor Feeder Conveyor—Trolley	342
D-2 Axle Feeder Conveyor—Trolley	756
D-30 Axle Feeder Conveyor—Trolley	620
Body Transfer Conveyor—Floor	520
D-2 No. 1 Body Feeder Conveyor—Floor	72
D-2 No. 2 Body Feeder Conveyor—Floor	72
D-2 No. 3 Body Feeder Conveyor—Floor	72
D-30 No. 1 Body Feeder Conveyor—Floor	72
D-30 No. 2 Body Feeder Conveyor—Floor	72
D-30 No. 3 Body Feeder Conveyor—Floor	72
Special Body Feeder Conveyor—Floor	72
D-2 Frame Transfer Conveyor—Floor	105
D-30 Frame Transfer Conveyor—Floor	90
D-2 Running Board Elevator—Cross Bar	85
D-30 Running Board Elevator—Cross Bar	85
D-2 Fender Elevator—Cross Bar	85
D-30 Fender Elevator—Cross Bar	85
D-2 Radiator Elevator—Cross Bar	85
D-30 Radiator Elevator—Cross Bar	85
D-2 Cushion Elevator—Cross Bar	78
D-30 Cushion Elevator—Cross Bar	78
D-2 Hood Elevator—Cross Bar	78
D-30 Hood Elevator—Cross Bar	78
Door Finishing Conveyor—Slot	35
Door Finishing Conveyor—Slot	35

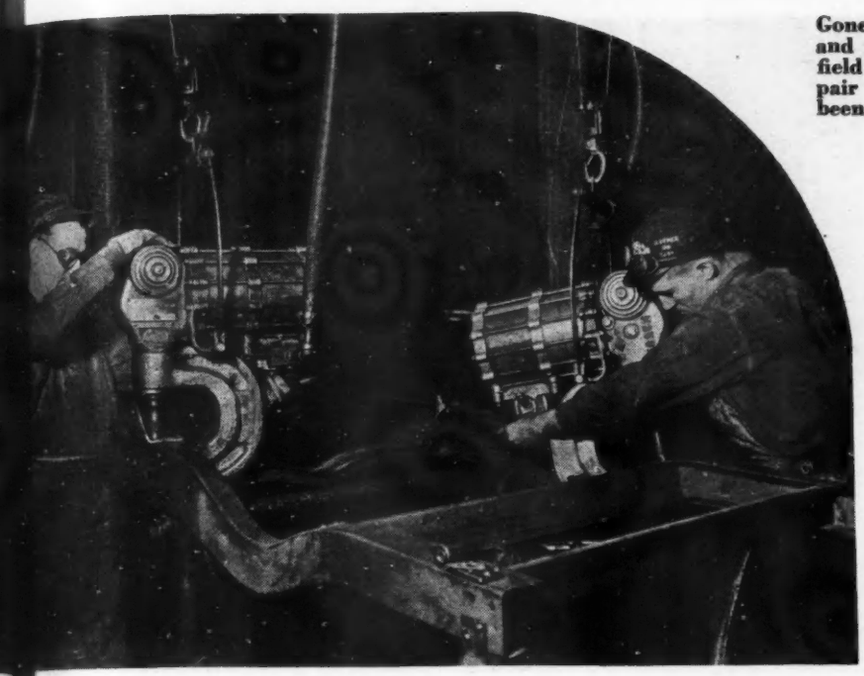
The conveyor line from the press shop to paint is 2260 ft. in length with two drives; the line to the body shop is 2550 ft. in length with two drives. Both conveyor lines are carried on special bridges over the creek.

The stamping plant will consume about 160 tons of sheet steel per day, 250 days per year, on the average. Sheet metal comes in at one side of the building and is stored in a bay adjacent to the press shop. Sheets are received in three-ton bundles which are handled by a five-ton Shaw bridge crane. The operation is so arranged that sheets are transported from storage to the line of square shears, then through the roller leveler, then to the presses in progressive stages. The leveler is a new Aetna Standard machine capable of handling up to 16 gage sheet, 68 in. wide.

Sheet metal scrap is baled in a separate building adjacent to the press shop, the baler having a capacity of about 25 tons per day. Waste has been reduced to a minimum by a control of trimming through the use of shearing charts as well as a systematic program of salvage control.

Press dies are stored in a separate building, an interesting feature being the use of aluminum paint both for identification of new dies and for protection against corrosion. Tools and dies are serviced in the press shop tool room which includes much modern equipment, the largest of which is a Gray combination planer-miller weighing 65,000 lb.

Apart from the press equipment, this unit has a large metal-finishing section containing some of the most modern welding equipment to be found anywhere, including several batteries of



Gone forever is the nerve-wracking fuss and noise of frame riveting at Springfield and Fort Wayne. This shows a pair of Hanna squeezers which have been installed for cold-riveting IHC frames.

Progressive gun welders—one battery for attachment of front fender brackets and parts, the other for radiator shell assembly. These machines are fitted with gun welding tools automatically controlled by Clark Controller timing.

Another feature of new equipment is the battery of two Federal seam welders for gasoline tank assembly. The wheels for seam welding are made from Elkalloy metal which has high conductivity and long life due to its great hardness. The welding guns on Progressive machines are fitted with tools tipped with Mallory 3T metal.

Sheet Metal Paint Unit

This department includes facilities for finishing all sheet metal and, in addition, houses a separate section for the assembly, cleaning, and painting of pick-up bodies.

To take care of the range of color options provided in the 1937 line, this unit is set up to finish sheet metal in color with synthetic paint while black parts are finished with high bake black enamel. For black enameling they have installed two new units, each one being a two-coat "A-type" oven, gas-fired and maintaining a temperature from

One of a pair of door-clinching machines used at Springfield for assembly of inner and outer panels. The three sets of forming rolls are seen coming 'round the bend.

Factory Routing, Differential Case—Flanged Half

(Fort Wayne Works)

OPERATION	EQUIPMENT
Rough and finish bore side gear and axle shaft bores and ream side gear bore. Rough, semi-finish and finish form spherical seat. Rough finish turn ring gear register pilot. Chamfer outside diameter of flange, ring gear register, side gear bore, radius, outside diameter and inside diameter of pilot diameter, and cut recess at back side gear bore	No. 5-D Potter & Johnston turret lathe
Drill (18) bolt and rivet holes	Model "B" type 16 Natco multiple drill press
Rough and finish turn outside diameter of hub and flange, face hub and chamfer outside diameter and inside diameter of hub and inside outside diameter of flange	No. 6-A Potter & Johnston automatic turret lathe
Spotface flange side of bolt holes and chamfer outside end of rivet holes	Single spindle Allen drill
Counterbore (8) tap holes and chamfer (12) holes on spider end	4-Spindle Leland-Gifford drill
Tap (8) holes on spider end	No. 2 Garvin tapper
Drill (2) oil holes	4-Spindle Leland-Gifford drill
Broach (2) oil grooves, file burrs from oil grooves at oil holes, hand ream burrs from bore	8-ton General flexible power press
File burrs from top of counterbored holes and register and blow out (8) tapped holes with air	
Grind bearing diameter on hub and bump shoulder	10x24 Norton external grinder
Mill (4) half holes	Special Newton hydraulic mill
Burr (4) half holes complete	

General view in body department at Springfield showing unusually high ceiling to accommodate the ceiling-suspended trolley conveyors and rails. Pick-up body assemblies may be seen in background.

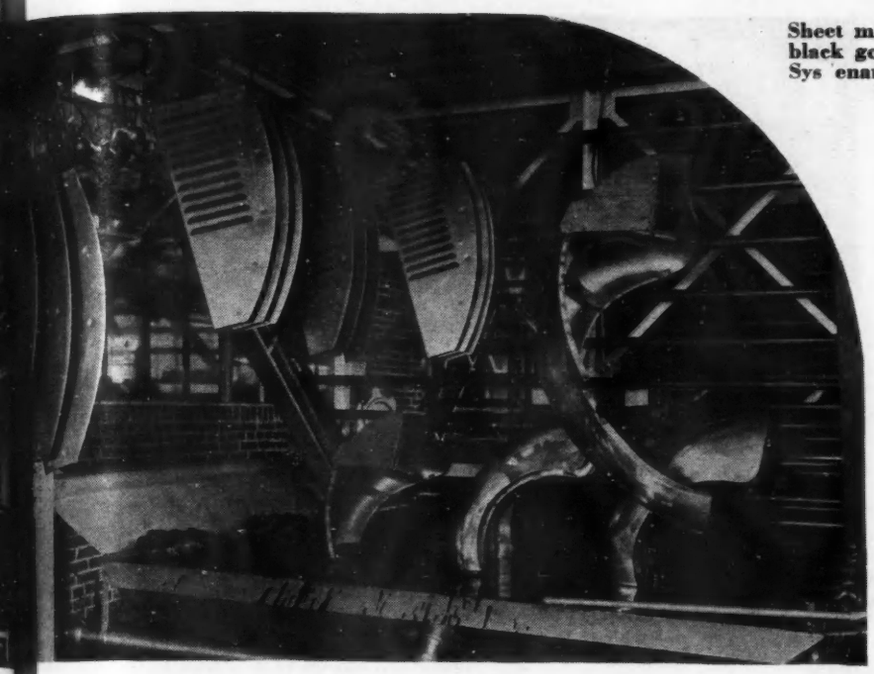
425 to 450 deg. Fahr. These ovens were built by Drying-Systems and feature precise automatic control, also a battery of Cuno filters for the enameling material.

In the interest of worker-comfort and quality finish, the work rooms are well conditioned by providing fresh, clean, warm air induced 25 per cent in excess of the amount removed. This system has a capacity of 7000 to 8000 lb. per hour.

The synthetic paint department is located in a gallery on the second floor and is completely new. All air entering it is cleaned and filtered through a system of oil-filter units. Spray booths all are of the Mahon water-wash type

Factory Routing, Transmission Clutch Shaft

OPERATION	EQUIPMENT
Cut stock to length	Buffalo shears
Upset	No. 5 Ajax upsetting machine
Cold trim flash	1½ in. Ajax upsetting machine
Anneal	Hagan annealing furnace
Pickle	Mesta pickle machine
Mill stem end to length	No. 4 Cincinnati mill
Center both ends	4x60 double end Sundstrand centering machine
Rough turn under head and pilot diameter, form radius and rough turn body	14x19 Fay automatic lathe
Finish turn under head and pilot diameter, form radius finish turn all body diameters, chamfer	14x19 Fay automatic lathe
Grind spline diameter and radius (0.001 in. limit)	10x50 Norton external grinder
Green grind pilot bearing diameter (0.001 in. limit)	10x50 Norton grinder
Rough and finish turn head complete drill, bore and recess and ream pocket bearing hole, counterbore, form 60 deg. center	8-spindle Cone automatic
Green grind 60 deg. center in head end	No. 75 Heald internal grinder
Drill oil hole and chamfer inside end	Leland-Gifford 2-spindle drill
Green grind large bearing diameter	10x50 Norton grinder
Grind 36 tooth gear diameter (0.001 in. limit)	10x50 Norton grinder
Finish face shoulder of bearing and turn lock ring groove	14 in. LeBlond engine lathe
Inspect	
Rough and semi-finish cut 19 teeth (2 cycles)	75A Fellows high speed helical gear shaper
Rough and finish cut 36 teeth	75A Fellows high speed gear shaper
Drill oil hole and hand ream burr from bore	2-spindle Henry & Wright sensitive drill
Stamp part number and date	Bench
Hob 10 splines	No. 215 Cleveland rotary hobber
Point 36 teeth	Lipe high speed double head tooth rounder
File burrs from both ends of 36 teeth, one end of 19 teeth and file rounding burr from 1 side of 36 teeth	
Finish 19 teeth	No. 1 Michigan shaver
Burnish 19 teeth	No. 2 Bolender automatic gear burnisher
Wash	
Inspect	
Harden. Rockwell C—48 to 53	Cyanide furnace
Wash and draw	Homo furnace
Clean centers of stem and straighten shaft at spline between centers to within 0.001 in. limits and shaft bearing to within 0.002 in. limits	Hump furnace; flexible press
Recheck and straighten, if necessary after piece is cold from hot straightening to within 0.011 in. limit at spline and 0.002 in. limit at bearing	Flexible press
Inspect	
Roll with master gear to remove nicks from 19T gear	Chard engine lathe
Check and mark nicks with chalk on indicator fixture	Bench
Grind nicks from 19T and 36T gears	Bench
Finish grind 60 deg. center in head	No. 72 A-3 Heald internal grinder with Garrison chuck
Finish grind bearing diameter	10x36 Norton grinder
Finish grind pilot bearing diameter	10x36 Norton grinder
Finish grind clutch taper and stone sharp corners	10x36 Norton grinder
Grind pocket bearing	72-A-3 Heald sizematic
Lap 19 teeth	Michigan gear lapping machine
Wash in "Stanisol" and hot water spray tank and blow off	
Inspect	



Sheet metal parts that are finished in black go through this new A-type Dry-Sys enameling oven which produces a high bake black finish.

Heald Sizematic is used for internal grinding of connecting rod big end. (Fort Wayne)

with positive pressure feed of fresh air to promote good working conditions.

In preparation for finishing, the sheet metal is automatically cleaned, washed, and dried in a unit consisting of a huge Blakeslee washing machine in combination with a Mahon drying oven. The Blakeslee machine is a three-stage alkaline washer handling 900 gallons of liquid per minute in each stage. It has a capacity of 12,000 to 14,000 lb. of metal per hour. The entire cycle through the washer and dryer is automatic and is handled on an overhead trolley line.

For final inspection of color finish, a portion of the department is fitted with high-intensity lighting which floods every section of the painted part and brings out the highlights.

Following current practice, each spray booth is provided with a series of independent paint feed lines—one for each standard color. The supply comes from a modern paint storage and mixing department. An outstanding feature of the installation is the use of the DeVilbiss, two-tank, spray system, in which the lower tank serves for mixing the color and agitation, while the upper tank is used for circulation only.

The paint shop is traversed by a system of overhead conveyors so as to facilitate the free movement of material through the unit and out to the assembly building. As mentioned earlier, the painted sheet metal conveyor which transports finished parts to the assembly building has a developed length of 3330 ft.

Assembly Building

This unit, which is practically all new, extends some 1570 ft. and terminates in an older building at the final assembly and inspection stage. It has a capacity of 450 trucks in eight hours.

Operations begin with the cold-riveted frame assembly, using the new Hanna rivet squeezers, and then progress through the subsequent stages on a continuous conveyor. Overhead feeder lines carry materials including axles, springs, engines, radiators, sheet metal, etc., to each assembly line directly at the point of use. Frame and chassis assembly takes place in the single-story section of the building and after painting, moves on into the two-story section for the final operations.

Bodies, sub-assemblies of radiators, fenders, etc., are handled on the second floor and are dropped to the point of use along the assembly lines, directly below, by 10 cross bar escalators and numerous electric hoists.

The entire length of the assembly building is traversed by three straight line assembly conveyors, terminating in the final inspection lines discharging onto coasting rolls where the trucks are tested, adjusted, and inspected. The assembly lines are scheduled as follows: (1) for small trucks, (2) for larger units, and (3) for trucks requiring special handling and special options. The assembly conveyors are of a new type, completely enclosed, and require no trucks or carriages since the chain is arranged to handle any wheelbase length. This is accomplished by a series of T-bars welded onto the chain with about 12 in. spacing.

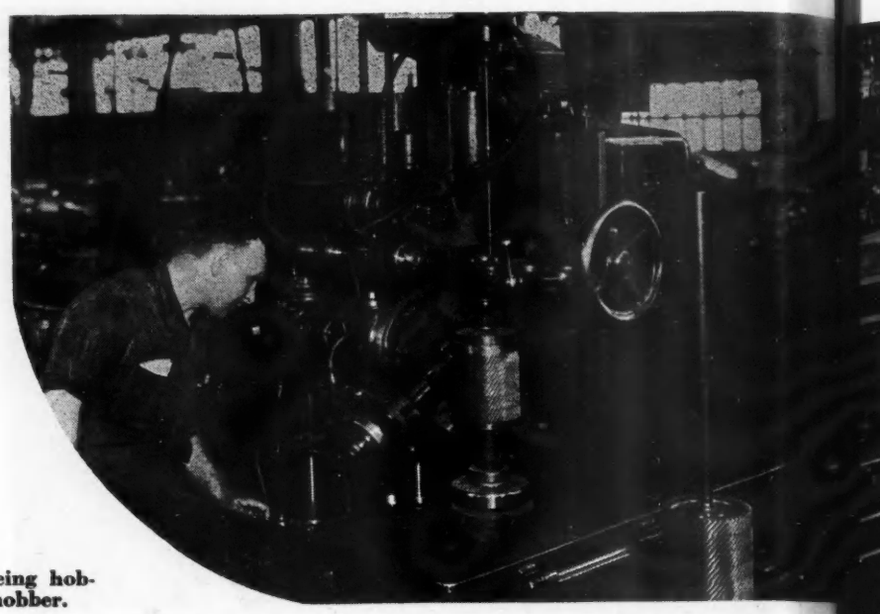
The assembly conveyor is completely shielded in the interest of safety and all conveyor lines are provided with an automatic lubrication system. Feeder lines parallel each of the three lines while sub-assembly stations are located at points of use at right angles to the line. For rolling the frame over, after frame assembly, they use two Curtis air hoists, one at each end of the frame.

Although the engines come in from other IHC plants, the fitting of special

attachments and accessories is scheduled here. For this purpose they have provided two short assembly lines with universal carriages capable of handling every engine used in the operation.

A novel feature of the equipment on the assembly lines is an installation of Black & Decker radial arm brackets fitted with portable tools for handling rear axle fastenings. This unusual bit of equipment is shown in the pictorial section.

After assembly, the chassis is sprayed with a synthetic material in spray booths built-in on each side of each line. The conveyor then enters a long Dry-Sys baking oven built right over the line for controlling the drying of the spray coat. The temperature of the ovens is held around 160 deg. Fahr.



Camshaft timing gears being hobbed on Lees-Bradner hobber.

Routing, Differential Carrier
(Fort Wayne Works)

OPERATION	EQUIPMENT
Rough and finish face of flange and bearing cap pads.	6-D Potter & Johnston
Turn and chamfer outside diameter of flange, chip fins from inside of casting	
Drill (12) flange holes, (4) bearing cap boss holes and drill (6) holes in pinion end	Model "B" Type 16 Natco multiple drill (two station fixture)
Burr 2 locating holes on both sides, (4) bearings, cap bolt holes and (10) flange holes on back side, and file burr from back side of flange	Bench
Ream (2) locating holes in flange	Single - spindle Leland - Gifford drill
Rough, semi-finish, bore and ream pinion bores, rough and finish face and chamfer pinion end	6-D Potter & Johnston turret lathe
Countersink (6) tap and (1) oil holes in pinion end	
Drill and tap filler hole	24 in. Cincinnati drill press
Tap (4) holes in bearing cap bosses	2X Garvin tapper
Tap (6) holes in end of pinion bore	2X Garvin tapper
Assemble caps to carrier and burr small diameter in pinion bore and wipe off	
Finish face flange and turn ears on caps	3A Warner & Swasey turret lathe
Rough bore and chamfer bearing diameters and bore thread diameter in cross holes	Spec. IHC two-way two-spindle horizontal hydraulic boring machine
Finish bore bearing diameter and mill threads in cross holes—both sides	Type "DD" two-way Hall planetary mill
Burr both halves of cross bore diameter and file burrs on flange. Remove burr from back of (6) tap holes in pinion end, burr (12) holes on flange.	

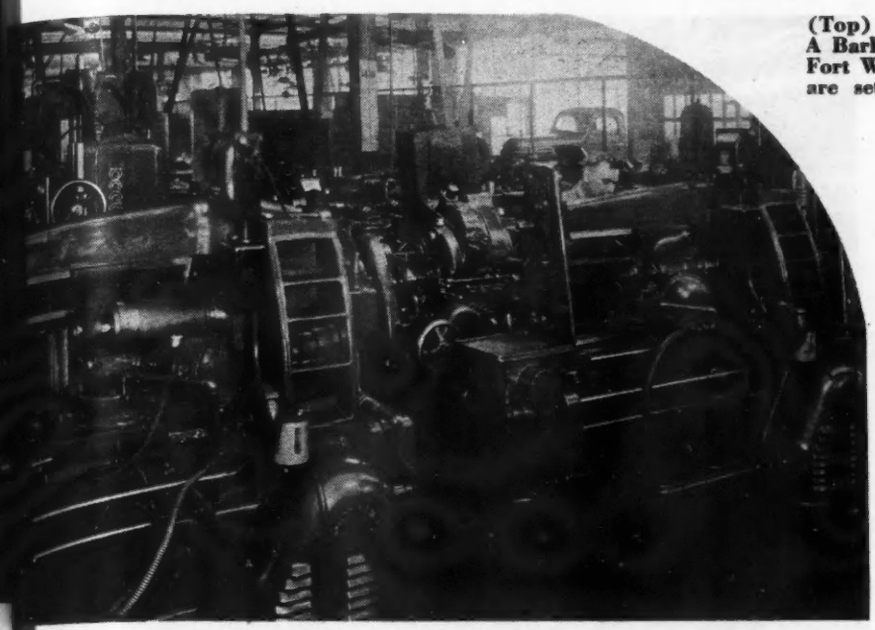
Tires are stored in a separate building and are delivered to the point of usage at the assembly line by a trolley conveyor 1800 ft. long. The conveyor and hooks are so designed as to eliminate manual lifting; the conveyor dips to floor level or table level as the case may be, and the tire is rolled in or out of the hooks.

At the end of the assembly line, the truck is transferred from the assembly conveyor to the floor conveyor where it rests on the tires. There is a pit section for touch-up and for check-up on all underbody fastenings. Then at the end of the line, gasoline and water are fed to the tanks from measuring cylinders.

Preceding final repair and inspection, each truck is tested on the chassis rolls, of which there are six sets, two for each line. Customer inspection preceding delivery is made in a separate building where the final inspection may be made without interruption and free from all extraneous noises. This building is fitted with chassis rolls similar to the ones built into the final lines.

So much for the assembly floor. Now for the activity on the second floor which serves as the feeder for the assembly lines. Here we find tire and wheel assembly stations; a small department for radiator and shell assembly; and another for front end sheet metal assembly. Here, too, is the body storage, the bodies coming in on carriages from the assembly department. The most unusual sight on this floor is the vista of seven body feeder line conveyors on floor chains, on which bodies are prepared for the assembly lines according to schedule specifications. These seven lines feed to three body drops, one for each line below.

The second floor also houses the facil-



(Top) Part of the battery of new Type A Barber-Colman hobbing machines at Fort Wayne. Both machines seen here are set up for hobbing metal timing gears.

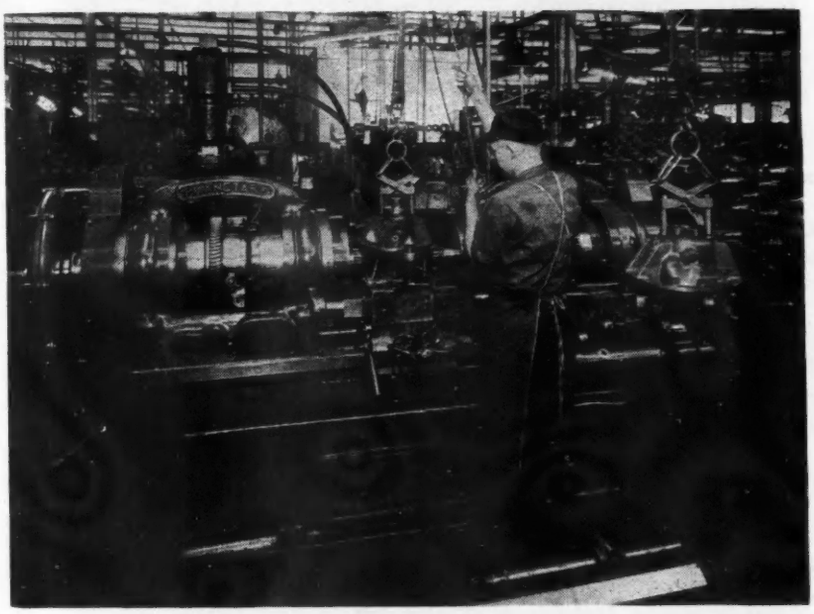
ities for body assembly, including the fabrication of all-steel cabs and panel bodies. All welding fixtures and welding equipment used in this department were built by the Progressive Welder Co. of Detroit. The approximate line-up of welding equipment will be found in the following table:

Welding Equipment for Cab Assembly

23 Portable Welders,
Second Floor, Bldg. No. 33
12 Portable Welders,
Third Floor, Bldg. No. 33
6 Expansion Welders

Hydromatics

Cab Sill Hydromatic
5—75 K.V.A. Transformers
156 SPOTS
Welds cab mounting bolt reinforcement and seat box risers and bottoms to sill stampings.
Roof Upper back and Lower Back Panel Hydromatic
1—75 K.V.A. Transformer
44 SPOTS
Welds roof upper back and lower back panel stampings.
Cowl Sheets Hydromatic
1—75 K.V.A. Transformer
28 SPOTS
Weld top and side cowl sheets together.



The third floor houses the facilities for panel body sub-assemblies and final assembly. Perhaps the most interesting features here are found in connection with door assembly. This starts with a pair of very ingenious machines, designed and built in the plant, which are used for automatically clinching the inner and outer panels, by means of a group of forming rolls pulled by a power driven draw chain.

This is followed by welding in a Progressive Hydromatic welding machine taking two doors at a time, spot-welding along the clinched edges. The equipment for door and panel body welding is given below:

Welding Equipment for Steel Door Assembly

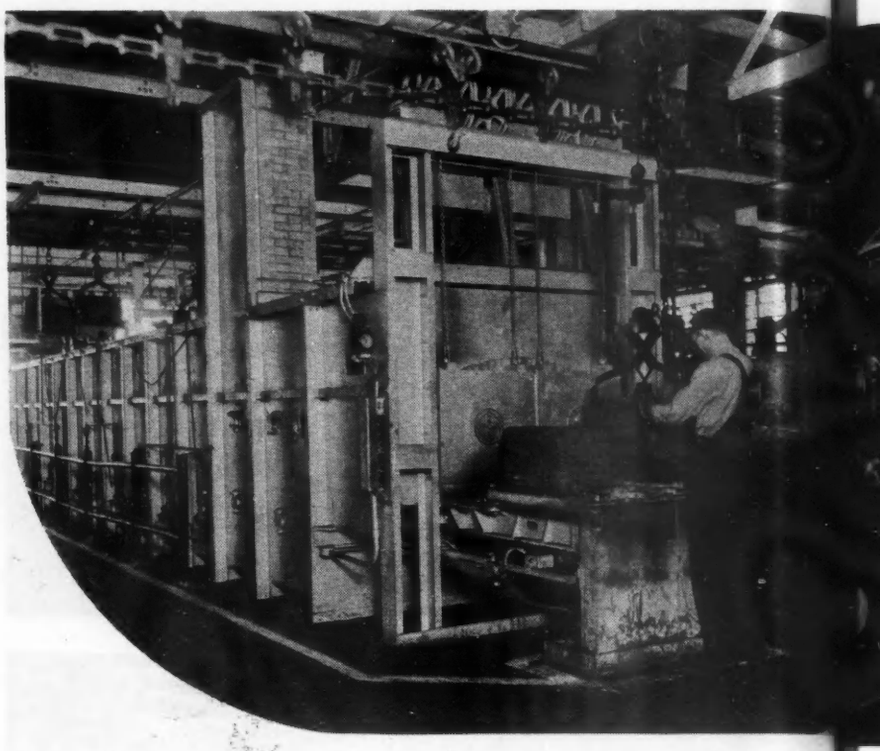
11 Portable Welders
2 Expansion Welders
1 Hydromatic
2—75 K.V.A. Transformers
70 Total spots. 35/each door.
Welds clinched edges of steel door.

Welding Equipment for Panel Body Assembly

25 Portable Welders (Two for Rear Door)
29 Expansion Welders (Four for Rear Doors)

(Center) Hall Planetary mill with two heads designed to assure perfect alignment of rear axle assembly. In this operation, at Fort Wayne, the differential carrier cross-bores are finish-bored and threaded in one setting.

(Bottom) Finest application of S-D Potter & Johnston heavy-duty turret lathe may be seen at Fort Wayne on machining of differential case halves. Note the massive turreted tooling, as well as the special spherical forming tool in the foreground.



Hagan built this huge gas-fired heat treating furnace for Fort Wayne. The heavy-duty overhead conveyor carrying Driver-Harris carburizing boxes is seen in the foreground.

Fort Wayne Works

The Fort Wayne plant which accounts for all heavy-duty truck production presents an operation of entirely different character since we find here all the facilities required for the fabrication and assembly of the major mechanical units such as engines, axles, transmissions, etc.

This plant has a floor space of 911,504 sq. ft.; and truck assembly line facilities capable of turning out a finished truck every four minutes. It is completely conveyorized so as to eliminate handling and trucking of materials to machines and to the assembly lines.

To us, the most outstanding feature of this plant is the unquestioned feeling of modernity as expressed in the layout of departments and particularly in the type of production equipment that is evident at every turn. It is no exaggeration to say that the equipment installed here will vie with anything that may be found in the most advanced automobile plant.

Consider for example that a heavy-duty truck plant of this kind has found it possible to tool up many applications of surface broaching—a comparatively new art and one which has been confined to mass production jobs. Here, too, are a number of fine applications of the Hall Planetary milling method. Batteries of the new Potter & Johnston heavy-duty turret lathes and Fostermatics should prove of intense interest to the production man.

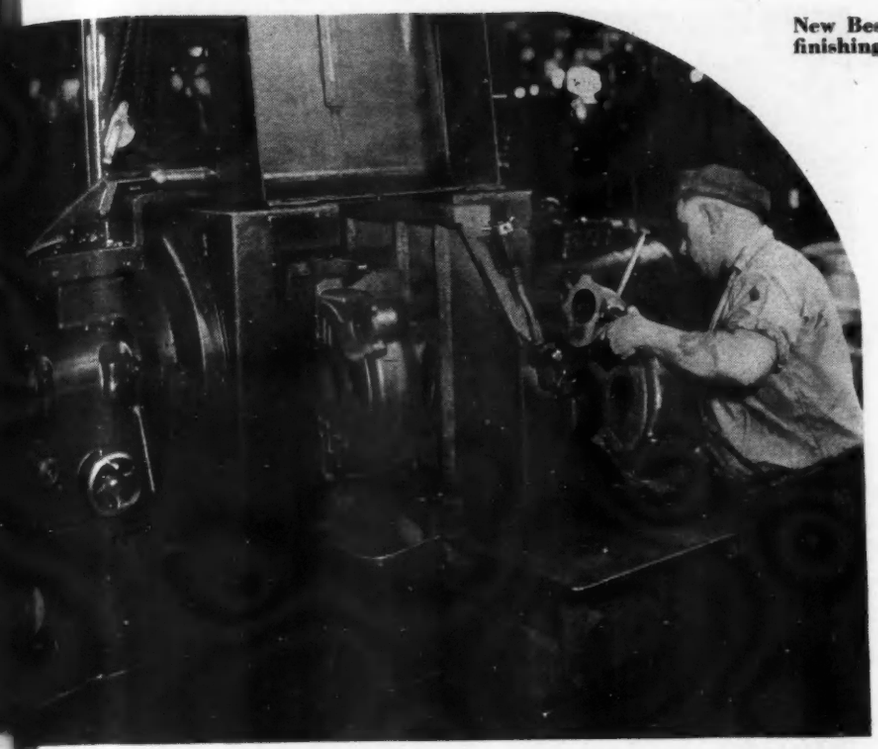
Another interesting item is a new Cone 8-spindle automatic, the largest of its kind which is used for turning gear blanks.

In the production of rear axle and transmission gears, they have impressed into service the very latest techniques known to the art. The new Gleason

Factory Routing, Steering Knuckle

OPERATION	EQUIPMENT
Cut stock	Buffalo shears
Forge, trim and restrike (upset vertical method)	Hammer (4000 lb. Erie) Toledo 57 trim press
Inspect	
Normalize	Holcroft normalizer
Harden	Holcroft rotary
Draw	Holcroft rotary
Pickle	Mesta pickle machine
Coin ends of (4) ears (for locating purposes)	900 ton Cincinnati coining press
Straighten	
Inspect	
Surface broach inside and outside of arms and spot for center	American surface broach —Model S-B-66-30
Drill, chamfer both sides and ream king bolt hole	W. F. & John Barnes special double end machine
Drill (4) tap holes	
Chamfer inside of king bolt holes	
Line broach king pin hole to size. (2 at one time)	V-32 American pull broach
Mill stem to length	Sundstrand rigid mill
Center both ends	Double end Sundstrand centering machine
Rough turn complete	Model U—Lo-Swing lathe

OPERATION	EQUIPMENT
Finish turn complete and chamfer thread end, face shoulder	Model U—Lo-Swing lathe
Drill cotter hole, chamfer one side and recenter	No. 2 Allen 3-spindle drill press
Drill dowel hole	Avey single spindle drill press
Rough grind (2) bearing diameters	10x18 Landis hydraulic grinder (double wheel mount)
Surface broach ears	S-B-48 30 American surface broach
Drill (8) holes and tap (2) holes straight pipe and tap (4) holes	4 Head W. F. & John Barnes special horizontal machine
Chamfer all (10) holes (1) 45 deg. countersink tool	
Press in (2) bushings, broach and burnish	Special Logansport horizontal press
Finish surface broach arms inside and arm clearance	American 6-H-T surface broach
Mill keyway and burr	Kent-Owens hand mill
Finish grind (2) bearings	10x18 Landis hydraulic grinder (double wheel mount)
Mill threads on stem	Hall planetary thread mill



New Besley surface grinder is used for finishing both sides of flywheel housing. (Fort Wayne)

Formate cutters are used exclusively in the production of rear axle ring gear and pinion sets. And on transmission gears we find such items of equipment as the new Barber-Colman Type A hobbing machine; Fellows high-speed gear shapers; Michigan Tool gear shavers; Michigan Tool gear lappers; Red Ring gear speeders, etc.

Because of the general complexity of the production process, we shall content ourselves with just a brief résumé of various departments relying upon the factory routings for complete information concerning the fabrication of numerous parts.

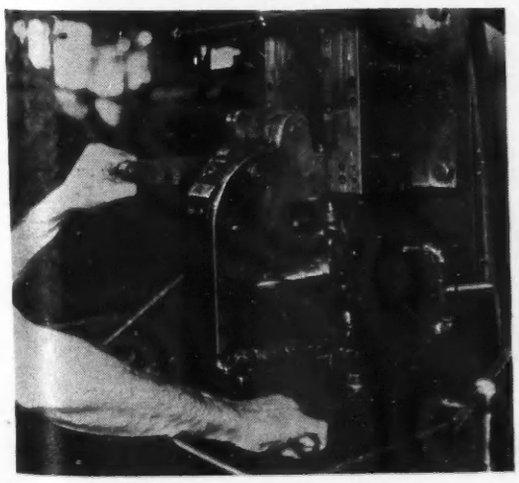
Transmission Department

In addition to the illustrations in the pictorial section, we have shown elsewhere the routing of the transmission clutch shaft which is quite typical of the techniques employed in gear cutting. As a matter of fact, this part represents one of the longest sequences of operations in the department.

It may be noted that this department has a large number of the new Barber-Colman Type A hobbing machines, one of which is used to rough-cut the 54 teeth on the camshaft timing gear, two blanks at a time. This gear employs two Michigan Tool gear shaving operations—semi-finish and finish—which is a rather novel feature. This procedure shows a little better why IHC finds it possible to built a quiet all-metal timing gear set.

Another of the Barber-Colman hobbing machines is employed to form-hob the external tooth profile of the synchronizer center drive unit.

Red Ring gear speeders are used to check gears for running and quietness. And finally, it is important to note that the entire gear department operation is controlled by checking through the gear laboratory equipped with the most modern gear checking equipment on the market.



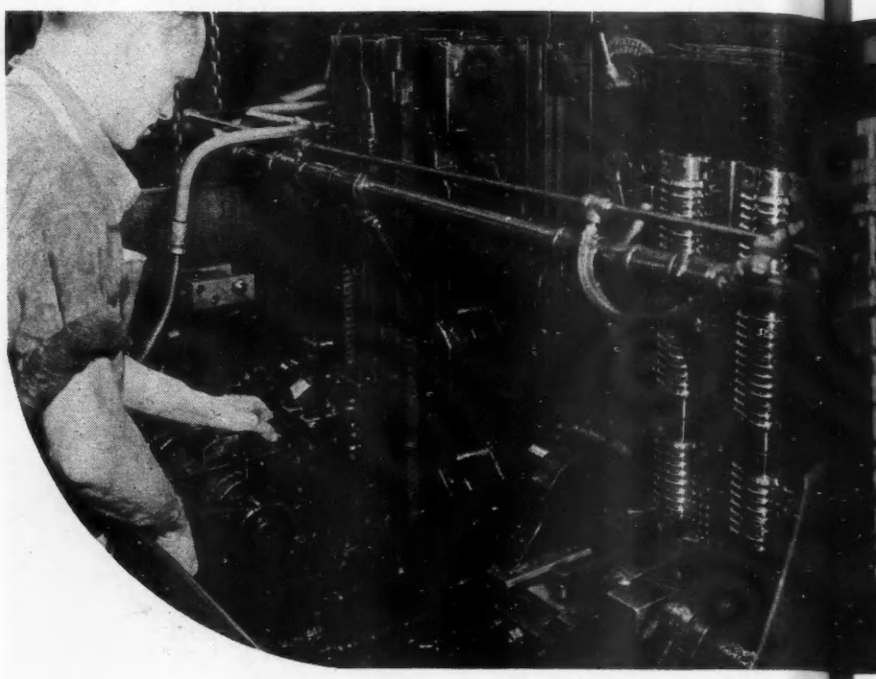
(Center) Foote-Burt designed this three-way machine for drilling and boring all holes in flywheel housing.

Surface - broaching steering knuckle ears is done at Fort Wayne on this American surface broaching machine. Note particularly the massive fixture.

Engine Department

The engine department has many bright spots which will be found illustrated in the pictorial section of this article. In addition, we have reproduced the factory routings on the connecting rod and wet cylinder liner, both featuring many new items of equipment.

It is well worth noting that Hutto honing tools with the new four-stick hone are used on all liner and cylinder honing operations in this plant. The only exception is found in the tooling on the new dry liner. The dry liner is



Colonial Dual Ram surface broaching machine is used at Fort Wayne for connecting rod machining. It broaches sides of rod, crank end and back of bosses, width of bolt bosses; and contact surfaces as well as half hole in rod and cap.

reamed on a new Natco reaming machine fitted with the Barber-Colman precision reamer. For assembly, the liner is held in a dry-ice chamber until it comes down to a temperature of minus 60 deg. Fahr., after which it is pressed into the honed cylinder barrel. Following this, the liner bore is honed on a new single-spindle Moline honing machine fitted with a four-stick Moline hone. This sleeve is cast from a special nickel alloy iron composition, developing a hardness of 600 Brinell after heat-treatment.

Flywheels are turned in two operations on a battery of the new heavy-duty Fostermatic turret lathes. Another new set-up is the machining of the flywheel housing. The first operation employs a unique Besly double-disc grinder; for the second operation they have a three-way Foote-Burt horizontal boring machine which drills all holes, rough and semi-finish bores and chamfers the large hole for the transmission end, and bores and reams the starter hole. W. F. & John Barnes built a special horizontal machine for this set-up, combining boring of the transmission pilot diameter with a planetary milling attachment for finish-facing the transmission mounting flange.

The crankshaft combines a modern set-up using LeBlond lathes and Norton and Landis grinders. Great pains have been taken to assure precise balance of the finished shaft and for this purpose they use an Olsen balancing machine in combination with a special machine designed to drill balance holes. This machine has a Snyder sensitive drilling attachment. Following this operation, each shaft is again checked on the Olsen balancer.

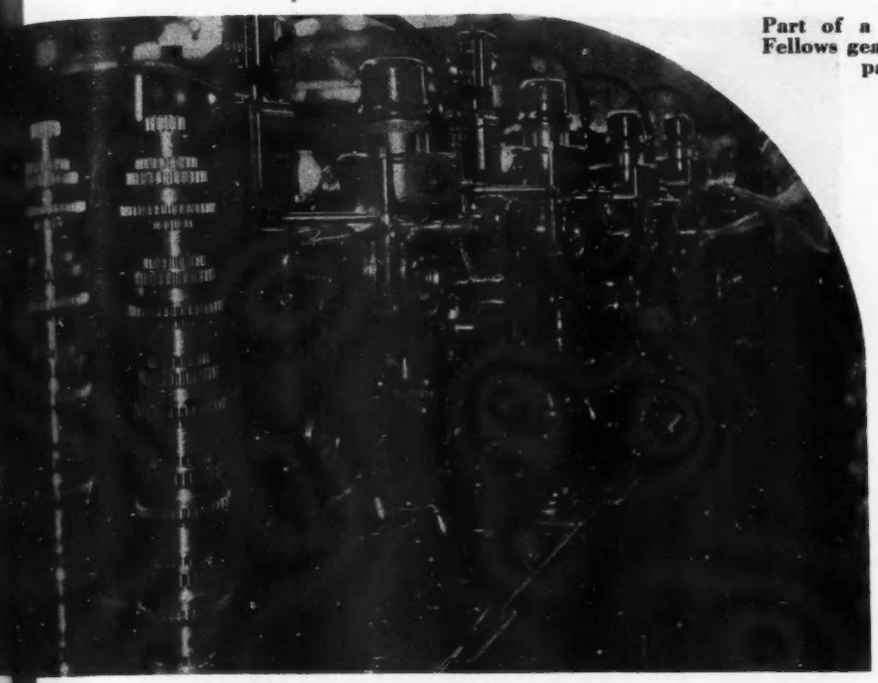
Fort Wayne is justly proud of its rather unique engine assembly line. Instead of the usual platform conveyor operation, the engines are built in a special cradle suspending on a universal hanger from a power-driven overhead conveyor line.

Heat Treat and Forging

It is worth notice that the forge shop produces all of the forgings used in

Factory Routing, Connecting Rod

OPERATION	EQUIPMENT
Cut stock	Buffalo shears
Forge, trim, and restrike	No. 2—300 lb. steam hammer
Normalize	Holcroft normalize furnace
Harden	Holcroft rotary furnace
Draw	Holcroft rotary furnace
Pickle	Mesta pickle machine
Coin	900-ton Cincinnati rigid press
Surface broach sides of rod, crank end and back of bosses for locating purposes, and contact faces and half hole in both rod and cap	VA2-24-48 Colonial dual ram surface broach
Drill, ream, chamfer (both sides) wrist pin hole both rod and cap (2 each at one time)	W. F. & John Barnes special machine
Drill and chamfer, ream bolt holes; spot drill for long oil hole, back counterbore both rod and cap (2 each at one time)	Greenlee horizontal machine
Mill bearing lock slots	Kearney & Trecker mill
Drill 7/32 oil hole (6 at one time)	Pratt & Whitney gun drill
Disc grind face of rod and cap to remove burrs	Vertical disc grinder (Besley Special)
Assemble rod and cap with (4) shim on side opposite bearing lock slots. Insert bolts, nuts and tighten	
Chamfer both sides of crank hole	21 in. Cincinnati drill press
Surface grind both sides of crank end	Hanchett special surface grinder with automatic locking and unlocking device
File grinding burrs on crank end	Bench
Internal grind crankshaft hole (gage 100%). Wash rod and clean out oil hole with air, burr lock slot and gage	Heald sizematic
Precision bore wrist pin end in rod	Coulter special 2-spindle machine
Press in bushings and burnish	General press
Diamond bore wrist pin hole in bushing	Ex-Cell-O, 2-spindle machine
Bearize	Cogsdill special bearizer and IHC special burr head
Final inspect and wash	

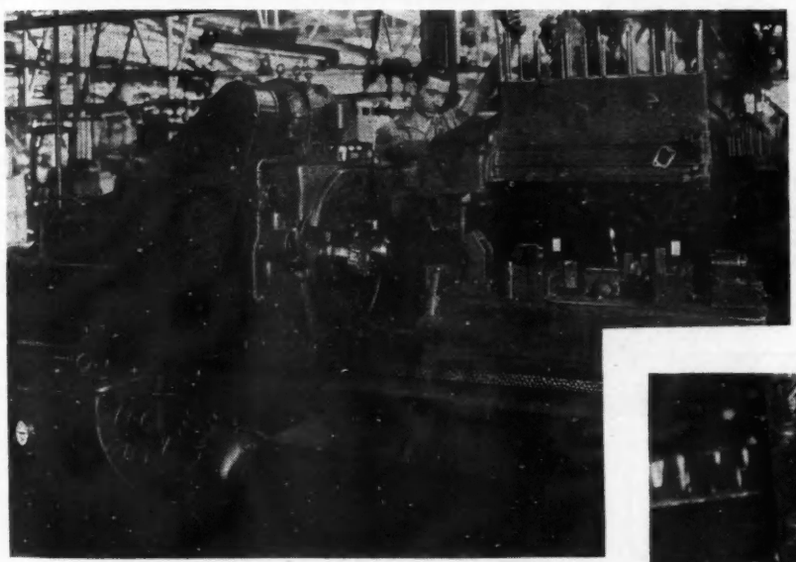


Part of a battery of the new high-speed Fellows gear shapers in the transmission department at Fort Wayne.

IHC trucks with the exception of the crankshaft. One of the latest items of equipment in this department is the 900-ton Cincinnati Rigidpress for coining various forgings including the steering knuckle and front axle spring pads.

The heat treat boasts of a large Hagan Furnace and a heavy-duty overhead conveyor chain that carries the carburizing boxes from the shake-out to the basement where the boxes are loaded.

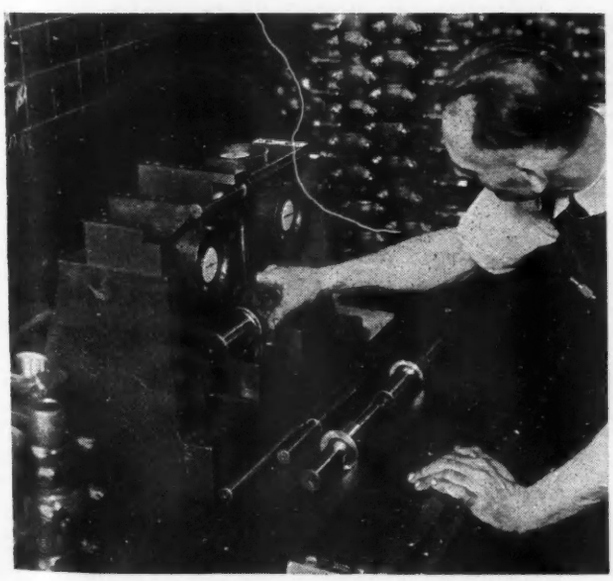
Two of the most interesting items of equipment are the new quenching machines built by Urschell. One of these, used on the front axle bed, first stretches the forging as it comes from under the hammer—stretching it some 1½ in. to a gage length; then, holding this dimension, the forging is quenched

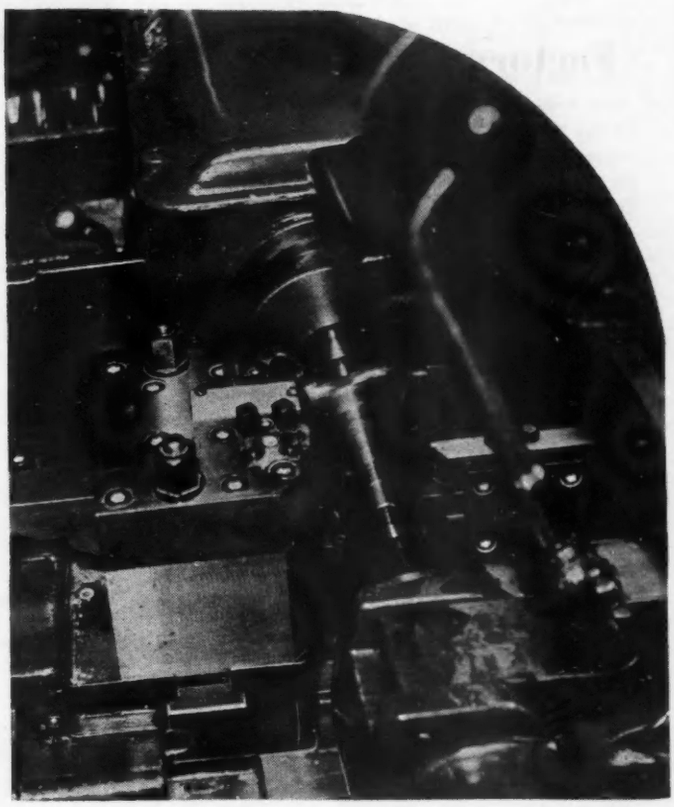


(Left) Special W. F. & John Barnes machine built for Fort Wayne has planetary head for facing and boring flywheel housing in alignment with crank bores. Massive fixture at right assures perfect alignment for this operation.

(Lower Left) Checking connecting rods for parallelism and plane using amplifying gages.

(Below) Monarch Magnamatic lathe set up at Fort Wayne for rough-turning steering knuckles.





Fort Wayne forge shop boasts two new Urschell quenching machines —one for bending and quenching steering arms; and the one shown here for stretching front axle bed forgings to gage, about 1½ in., and then quenching.

in the same setting in the machine.

The second quenching machine is even more complex and interesting in operation. This is a two-station machine used to form the steering arm and quenching it in the same seting. In operation, the forging is clamped in the fixture and then rolled to shape around a barrel-formed cam; the entire fixture then rotates 180 degrees, immersing the formed piece in the quenching solution. During this interval, a finished forging is removed from the other (exposed) side of the fixture, and another forging is clamped in place.

Steering knuckles are forged by the upset method using billets rolled to the approximate contour of the stem and then forging in a plane perpendicular to the axis. This produces a 30 per cent saving in trimming and flash and develops a much better grain flow.

The method of forging connecting rods also has been radically changed. The rod and cap now are forged separately, coining both sides of the wrist pin bosses, crankshaft bosses, and I-beam sections. This eliminates the usual straightening operations before machining.

Miscellaneous

Much careful planning went into the set-up for rear axle production. Two excellent examples of the tooling and procedure will be found on the routings for the differential case and the differential carrier. The latter utilizes Potter & Johnston heavy-duty turret lathes, and a type DD two-way Hall Planetary mill for boring cross bore diameters as well as milling the threads in each bore.

Production on the Hall Planetary operation is very high due to the fact that the amount of feed depends only upon the depth of thread plus the planetary motion of one cycle.

The differential carrier utilizes two 6-D Potter & Johnston machines. On the first operation a special fixture is used to supply proper backing for the flange, and a driver. The carrier casting is held in three jaws which are brought into contact with the rear end of the hub for centralizing. After rough and finish-facing the flange and bearing cap lugs, as well as three cuts on the outside diameter, the work is taken to the second operation machine.

Assembly Building

Truck assembly is handled on two separate conveyors—one for the general run of heavy-duty options characteristic of about 90 per cent of production, the other intended for the remaining 10 per cent constituting features which require altogether special handling. Some of the special features have become so involved and differ so much from the usual that a new special equipment department has been set up to handle the details of scheduling this one line.

In general the assembly operations move in straight lines from the receiving dock at the extreme end of the

Factory Routing, Cylinder Sleeve

(Fort Wayne Works)

OPERATION	EQUIPMENT
Grind (1) spot for Brinell test	IHC emery stand
Inspect for hardness	
Turn skirt and under head (for bore location) face off bottom end of sleeve	14x19 Fay lathe
Rough and semi-finish bore	6-spindle vertical Putnam boring mill
Saw off driving lug	Pratt & Whitney hand mill
Rough turn outside diameter and straddle face head. Turn outside diameter of body. Face bottom end	14x19 Fay automatic lathe
Semi-finish turn outside diameter and straddle face flange and semi-finish turn skirt	12 in. Sundstrand stub lathe
Chamfer both ends of bore	No. 5 Foster turret lathe
Finish ream hole	Natco single spindle vertical hydraulic drill
Finish turn outside diameter and straddle face flange and finish turn skirt	12 in. Sundstrand stub lathe
Semi-finish hone bore	Hutto hone 6-spindle
Finish hone bore	Hutto hone single spindle
Inspect and stamp for size	Bench

Hanchett surface grinder with big rotary fixture is employed for grinding sides of crank bearing on connecting rod assembly. (Fort Wayne)

building. The first step is the frame assembly which is cold-riveted using the new Hanna rivet squeezers. Then comes chassis assembly, final assembly, and inspection.

A novel feature in this plant is the practice of washing the entire chassis assembly prior to painting so as to assure a quality paint job. The paint is a special material having rapid air-drying characteristics which make it unnecessary to provide auxiliary heat.

As mentioned earlier, the scheduling the lines as well as of all parts production is done by telautograph under the direction of the sales department. The building schedule for parts and units is laid out five days in advance and meetings are held with the foremen of each department to check on the progress of the schedule. At this time the actual dating of shipping orders is determined and the lines are then scheduled two days in advance, giving the timing of specific trucks, hour by hour.

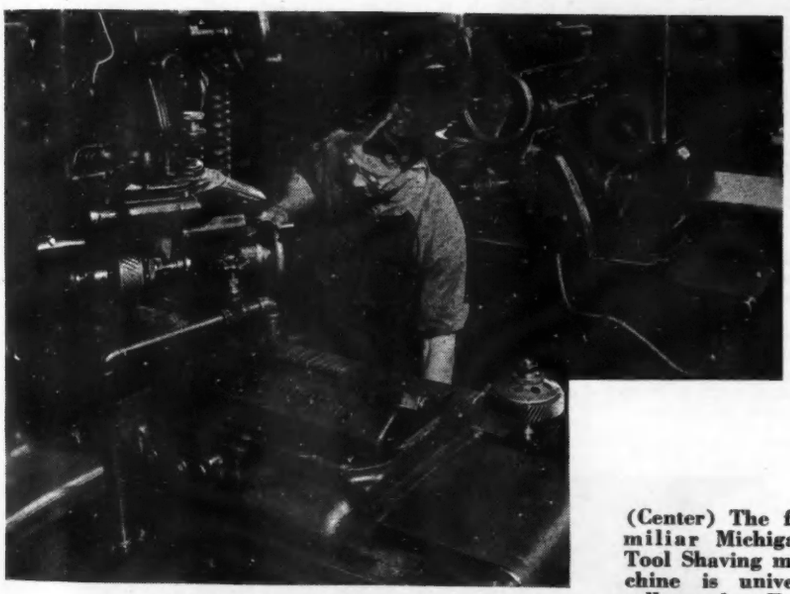
Parts Depot

One of the most comprehensive arrangements for handling world-wide distribution of spare parts is found at Fort Wayne. Spare parts for current models as well as for all IHC trucks still in operation, regardless of age, are stored in bins in the basement of the assembly building.

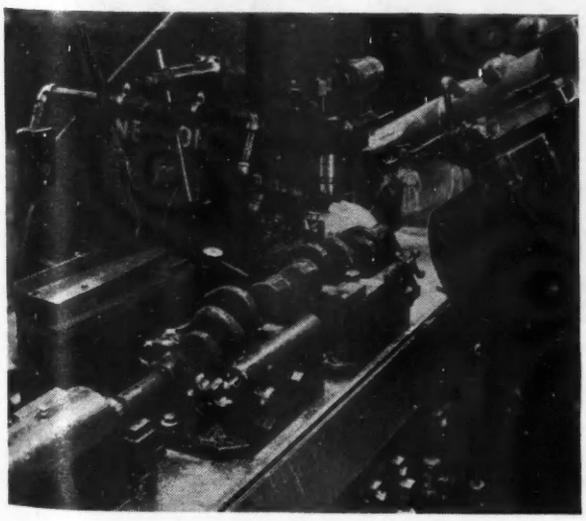
Parts orders are filled by a crew of stock clerks. Each order is placed in a separate packing box or case and moved by hand truck to a roller conveyor along one wall of the stock room. The hand truck platform height corresponds to the level of the conveyor so that the clerk simply slides the box off the truck and pushes the container into a section of the conveyor which serves as an elevator.

From this point on things happen automatically. As the box enters the elevator section, it is automatically lifted to a ceiling-suspended roller conveyor and is moved into another station containing an automatically-recording weighing device. The scale is in a locked booth on the floor and the weight transfer is achieved by means of a piezo-electric contact. Immediately, the scale beam comes to a balance and prints a ticket giving the exact weight of the load.

The box remains in about this position until the next load approaches the weighing area; then the next box pushes it onto a power-driven belt which transports it to the first floor shipping department.



(Center) The familiar Michigan Tool Shaving machine is universally used at Fort Wayne. Here it is shaving a metal timing gear — a very unusual application.



(Bottom) This big Newton mill is used for milling locating spots on crankshaft forgings.

What Happened at Caterpillar

These are the facts, taken directly from the record

ON March 22 representatives of the Association of Amalgamated Iron, Steel and Tin Workers of North America, a CIO affiliate, went to the Peoria offices of the Caterpillar Tractor Co. to discuss with management a list of eight demands previously submitted. The CIO men sought, among other things, sole bargaining power for the 12,000 company employes.

When the organizers, headed by Joseph Dernoncourt, an ex-coal miner, arrived at the meeting room they were surprised to find 100 other persons present in addition to the Caterpillar executive personnel. The guest audience, invited by B. C. Heacock, company president, was composed of members of the Caterpillar Girls' Club, department heads, employes from foundry, tractor and road machinery shops, members of the employes' relief association, several employe members of the A. F. L., and officers of A. F. L. craft unions. Also present were reporters for Peoria's three daily newspapers and a court reporter to record the session verbatim.

Mr. Heacock spoke at length, explaining company policies, functions of management in its relation to customers, stockholders, and workers. With particular reference to labor organizations he said, "Our basic principle is that we believe every man in America has the liberty to join or not join any union or any organization which may be approved by decent society. . . . We believe that every 'Caterpillar' man has a perfect right to discuss his employment with management in any way he pleases."

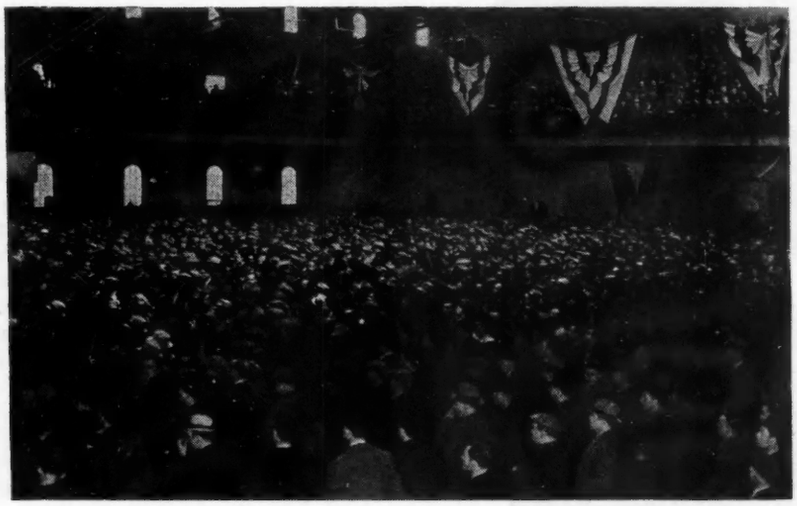
Mr. Heacock pointed out that other labor organizations had been asked by some of the company employes to represent them; several telegrams were read by way of confirming this. The eight demands of the CIO union were examined point by point and, in each case, it was demonstrated that all reasonable requests were already part of the company's policy.

"I hardly thought that we would have a mass meeting this afternoon . . ." said Joseph Dernoncourt.

Mr. Heacock replied, ". . . as we are talking about the welfare of wives, the children, the families of 12,000 Caterpillar employes, I am quite sure you will agree that it is entirely proper that any number who can hear us during our conference should be privileged to do so." The CIO spokesman agreed.

As the meeting progressed, Mr. Dernoncourt sought to push negotiations

(Turn to page 669, please)



OFF THE RECORD

While final negotiations progressed between company and CIO representatives nickels and dimes contributed by Caterpillar workers paid the expenses of an election to determine whether a majority of workers wished to continue on strike or return to work.

THE PICTURE

Each member of this crowd in the state amory in Peoria identified himself as a Caterpillar worker and was supplied with a printed ballot. Of those in the picture, only 286 voted to continue on strike.

OFF THE RECORD

Peoria municipal elections which took place during the Caterpillar negotiations brought stinging charges of fraud and corruption.

THE PICTURE

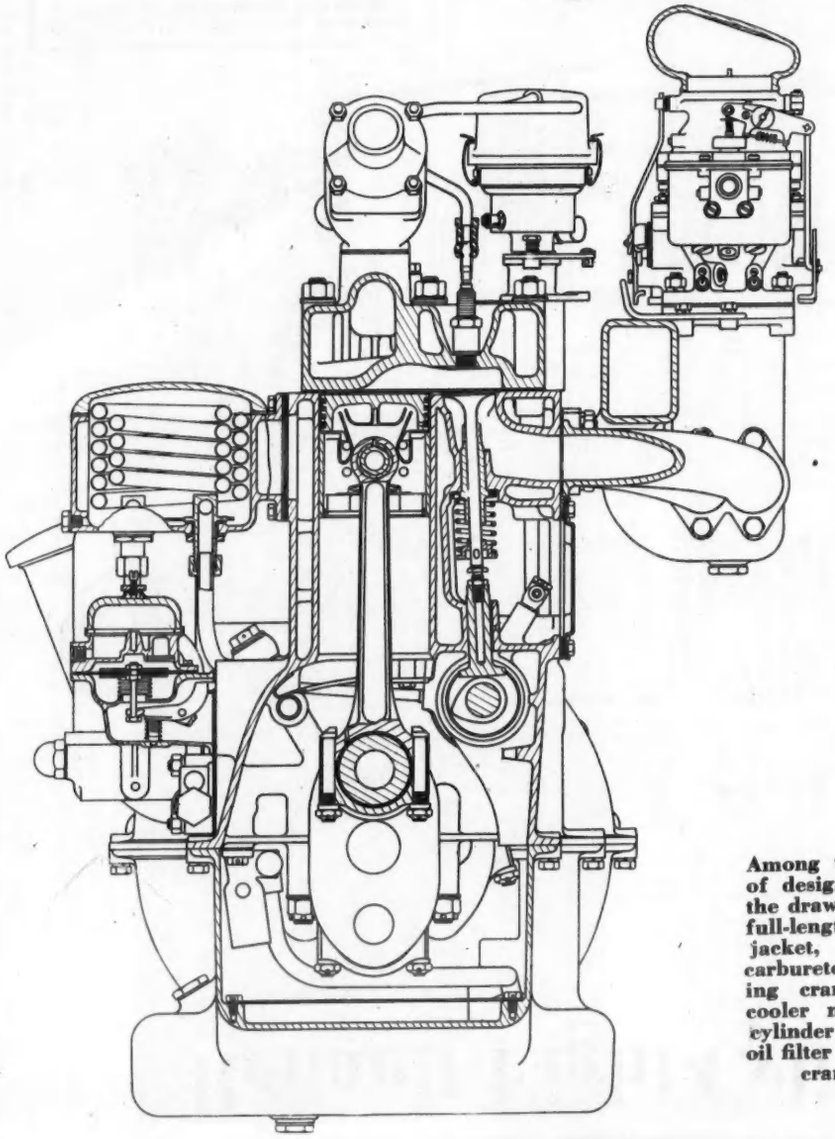
Honesty of the employes' election was promoted by the presence of city police at each of the standard ballot boxes borrowed from municipal authorities.

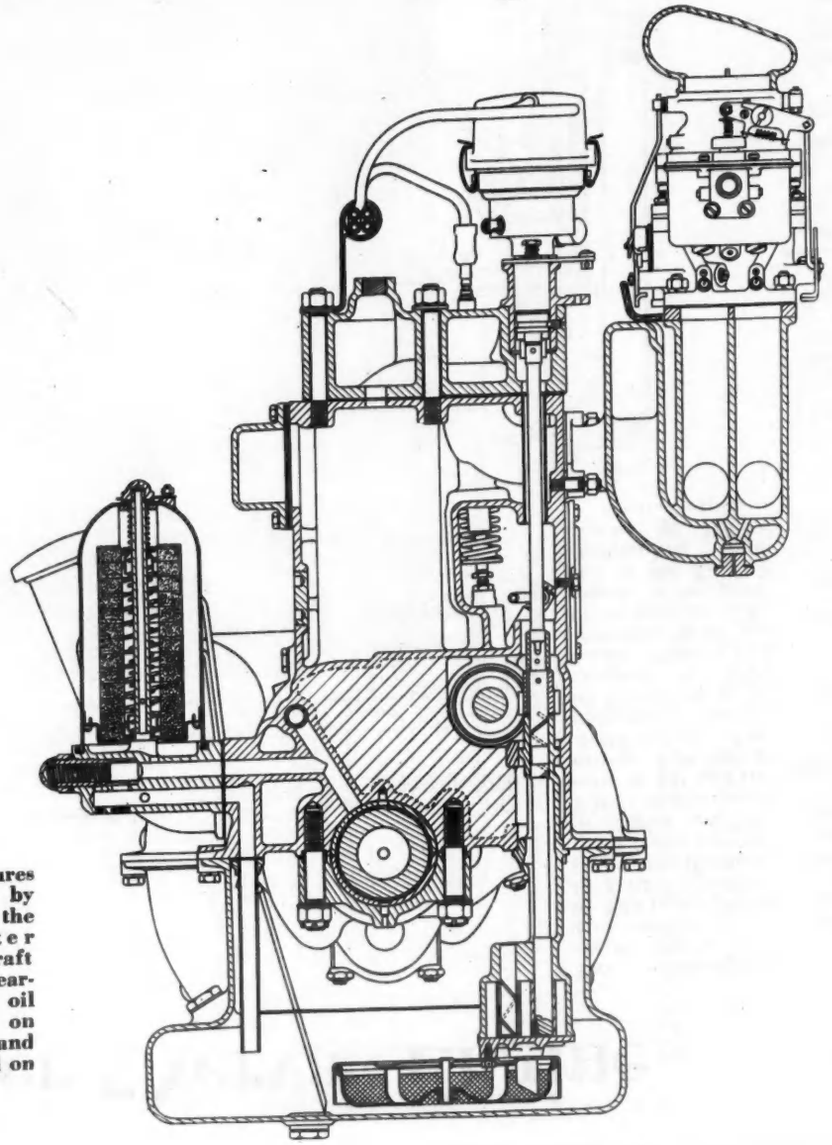
Renault Eight-Cylinder "Nerva" Engine

This eight-in-line engine has a bore and stroke of 85 by 120 mm. (3.346 by 4.724 in.), making its displacement 5484 cu. cm. or 334.5 cu. in. The compression ratio is 5.9 and the rating, 110 hp. at 3400 r.p.m. The maximum torque of 232 lb-ft. is developed at 1800 r.p.m. Pistons and cylinder head are of aluminum. The engine is the product of the Renault Automobile Company of Billancourt, France

No. 23 in the Automotive Industries Series of Engineering Drawings

Renault Eight-Cylinder "Nerva" Engine





Among the features of design shown by the drawings are the full-length water jacket, downdraft carburetor, five-bearing crankshaft, oil cooler mounted on cylinder block and oil filter mounted on crankcase.

What Happened at Caterpillar

(Continued from page 666)

ahead on the basis of the memorandum previously submitted by the union. One of the points in the memorandum provided that in the event of the company and the union being unable to come to agreement during disputes, an impartial umpire should be appointed, and his expenses borne jointly by the company and the union. This suggestion brought from the spokesman for the company the following retort:

"When you ask for an impartial umpire you know . . . that that is a tool to take supervision from its management, its final authority . . . We are going to have no trouble reaching agreements on things that are already current practice, but we are going to have a lot of disagreement before we agree to continue responsibility of management and have the authority vested in somebody else. . . ."

Mr. Dernoncourt ventured to question Mr. Heacock's familiarity with actual working conditions in the Caterpillar shops, saying that he, Dernoncourt, actually mingled with employes. The company president protested, "And I wouldn't speak to one if I saw him?"

Quickly, almost apologetically, the union leader replied, "No, you are not snobbish. To the contrary, you have gone through the shop and spoke to your old employes and patted them on the back and held conversations. You are very democratic, if what I have heard of you is true, and I think they are."

Shortly after this exchange, the union spokesman reverted to the arbitration question with the query:

"Are we to understand then, Mr. Heacock, that the company will not sign such a document carrying with it that impartial umpire section?"

"Yes, we cannot."

Out of the parleying that followed evolved arrangements for another meeting. The date was set for April 6. The interim would afford the management time to explore the intricacies of the union document. The curtain fell on the first act. Copies of the transcripts made by the court reporter were distributed by the company to its employes.

At the April 6 session C. Parker Holt, executive vice-president of Caterpillar, acted as management spokesman. He read aloud the union agreement, then addressed the CIO representatives —"We must keep carefully in mind the dual position occupied by your committee. If and when you come to us as the authorized representatives of any employe or employes of our company for the purpose of correcting any inequity affecting that employe or those employes we will, as Mr. Heacock has already assured you, be glad to hear you at any reasonable time. When, however, you seek a meeting with us for the purpose of effecting an agreement, you are then coming to us in an entirely different capacity."

Stating that it would not be possible for the company "to enter into any agreement with any organization without being fully informed as to the purposes, practices, and objectives of that organization," Mr. Holt propounded some questions to the union representatives.

The barrage of interrogation that followed included such questions as: "Has the Amalgamated Association of Iron,

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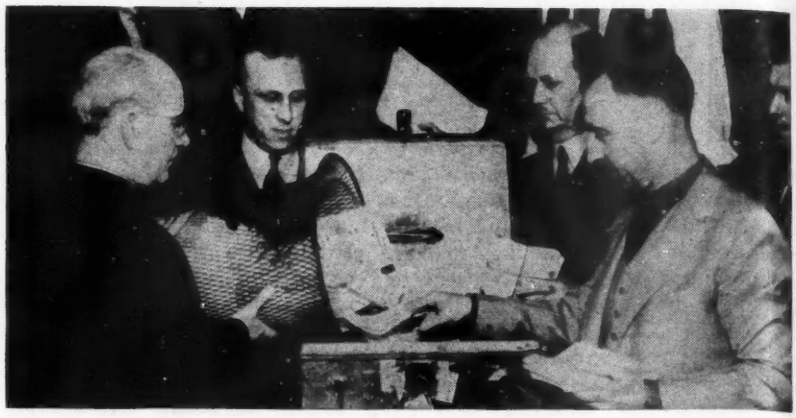
OFF THE RECORD

The employes' committee which arranged the election selected a Roman Catholic priest, a Protestant minister and two business men not connected with Caterpillar to act as judges of election.



THE PICTURE

. . . shows the judges counting the ballots, which resulted in an overwhelming decision of those voting to return to work.

Steel, and Tin Workers any by-laws and constitution? In just what way will the agreement you propose improve industrial economic relationships? Are you now collecting initiation fees? If so, how much? Are you now collecting dues? How much? If not, do you contemplate collection of fees? What will be the disposition of the large sums of money you collect? In what manner or what proportion will this money be spent for the benefit of the people who contribute to the fund? How is the money used that stays here? And how is the money used that goes to headquarters? What accounting is given to members regarding the disposition of their funds?"

Union representatives made no direct reply to these questions.

Swiftly Mr. Holt proceeded. A statement of company policy addressed "To Employes" was read. It listed, in effect, policies of the company in existence—most of them—for 20 years. Copies of this statement "we are posting on our bulletin boards."

It was explained by the management that only one kind of agreement would be satisfactory . . . an agreement "with each and every employe of the company . . . therefore gentlemen, we are unable to accept the agreement you have presented to us."

Mr. Dernoncourt, at the conclusion of Mr. Holt's presentation, suggested hopefully, "Would you be willing to sign the contract as just read by yourself with the Steel Worker's Organizing Committee?"

The answer in so many words was "No."

Abruptly the session was ended. As the CIO men filed out, a signal was given and the sitdown strike began.

Approximately 30 workers sat down, by nightfall the plant was closed, and a barricade of tractors thrown out by striking employes. Heat treat and foundry men were permitted to pass through picket lines to attend material in process so that it would not be ruined. During the night the sitdowners were joined by about 50 others who scaled the fences. Company

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officials made no attempt to eject the men remaining in the plant. And during the action, in fact for the duration of the strike, there was virtually no violence. Minor brawls broke out occasionally. On the whole there was very little disorder.

Meanwhile, several employes of their own volition formed an employes' committee. They made arrangements through radio broadcasts and newspaper announcements for an employes' referendum at 10 a.m., April 6, in the state armory in Peoria. Thousands of employes stormed the armory at the appointed hour. Workers who properly identified themselves were given printed ballots on which they marked "Yes" or "No" to the questions: "Do you favor continuing out on strike?—Do you favor returning to work? There was no preliminary haranguing or debate, the employes simply voted and passed out of the building. A disinterested citizens' committee watched over the balloting, and with the ballot boxes safely conveyed to the sheriff's office, the same citizens presided over the tabulation of returns. Final count revealed only 286 favoring continuation of the strike, while more than 5000 voted to return.

As ballots were being counted, another conference was in progress between CIO men and Caterpillar management. Again Mr. Holt presided. On hand at this meeting was Joseph Vincent, conciliator for the State Department of Labor—who happened to be in town at the time. Mr. Holt suggested to the union representatives that some progress might be made if Mr. Dernoncourt could clarify his meaning in his question asked at the preceding session which was: "Would you be willing to sign the contract as just read by yourself with the Steel Worker's Organizing Committee?" Mr. Holt suggested, "Maybe we didn't investigate that as far as we should."

The company spokesman explained that the agreement was a unilateral agreement in law. . . . "I think we would be willing to sign it with any employe or with any organization representing those employes, but it would take a few minor changes."

"I am willing to do this," said Mr. Dernoncourt.

The conferees then proceeded to arrange the company statement in suitable documentary form. As the first step Mr. Holt suggested, ". . . suppose we put up at the top there: 'To the Steel Worker's Organizing Committee'?" Mr. Dernoncourt wished it to be addressed to the Amalgamated Association of Iron, Steel and Tin Workers of North America. Yes, that would be satisfactory to the management. And, said Mr. Dernoncourt, "Of course, you would have no objection to including 'Lodge Number 1106'? That is the local lodge number." That, too, was satisfactory with the management, ". . . we will put all the lodges you want after that."

Each section of the agreement was agreed to, though not without some debate. As the conference proceeded, the transcript of the meeting shows in italics: *At this point, the loud sounds were heard of a disturbance outside—the conferees went to the window and observed violence in the street.*

Mr. Dernoncourt: "Pardon me, but there seems to be quite an unusual amount of activity on the outside."

Mr. Holt: "While we are going on, there are things going on outside that are a disgrace to all of us."

Mr. Lewis (union rep.): "That is right."

Mr. Allen (union rep.): "That is right."

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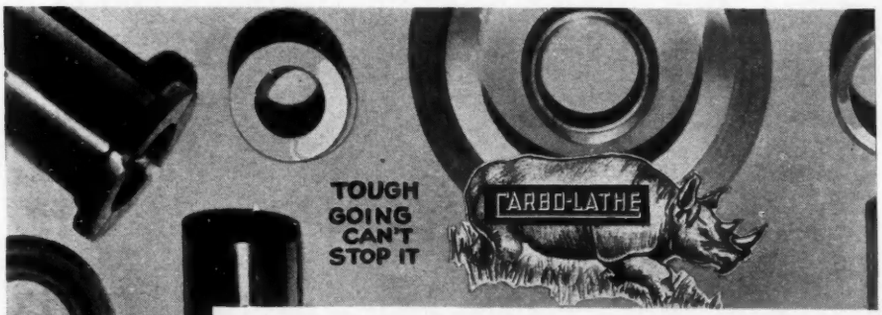
"We are almost through," said Mr. Heacock, "and I would like to say, Mr. Dernoncourt, put an end to your —— nonsense." Mr. Dernoncourt was sorry he said anything about it.

There was a little more discussion about the points in the agreement, not much. And, finally, the original company document—with virtually the only change being the insertion of the clause "and their duty authorized representatives"—was ready for signature.

Said Mr. Heacock to Mr. Dernoncourt: "I don't want to dramatize this at all, but members of the press have been out there to report to the public, and those photographers are there, too. Don't you think it would be courtesy and the decent thing to do to let them take a picture after about all but you and Mr. Holt signed it?"

The strike was over; settled in 51 hours. No time provision was written into the agreement. And, in effect, the CIO recognized the company employe policy and accepted its provisions. Foundry employes were called back by radio and telephone to work on the night shift. Next morning the entire day shift reported.



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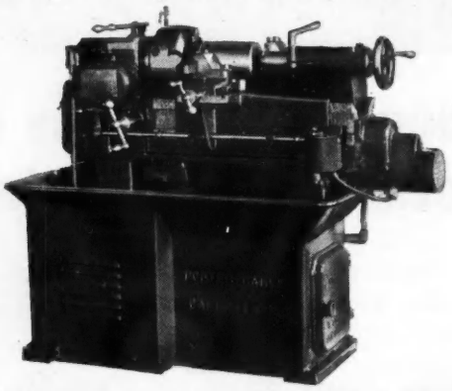

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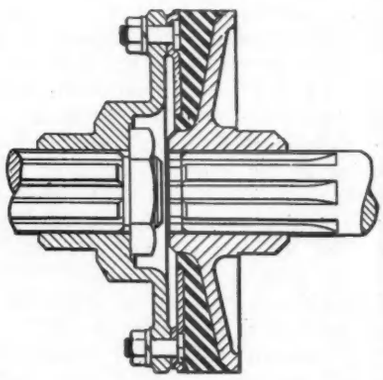
PATENTS

IT has been realized for some years that if it is desired to utilize rubber as an elastic member in mountings, transmission members, etc., to best advantage, it must be put under tension instead of under compression. Whereas most of the earlier flexible mountings for automotive engines consisted of rubber blocks or rubber washers, recently the rubber members of such mountings have been vulcanized to steel members with vertical surfaces so that the weight of the engine subjects the rubber to shear or to tension.

The same principles apply to rubber members in transmission lines. Flexible driving members in the transmissions of automobiles are an old idea, but where rubber was used it has usually been worked in compression in such members. In such flexible couplings it is desirable that they should have not only a certain torsional flexibility with a certain axial flexibility. Such a coupling has been patented recently to Harvey D. Geyer of Dayton, O., who assigned his patent to General Motors.*

Mr. Geyer's invention covers the



combination of a metal hub in driving connection with one of the shafts, this hub being formed with a concentric conical surface, with a concentric annular metal plate at some distance axially from the conical surface and in driving connection with the other shaft, and an axially flattened resilient rubber ring between the flat and conical surfaces and bonded thereto by vulcanization. The thickness of the rubber ring varies in substantially direct

* U. S. Patent No. 2,051,442. Resilient Coupling for Transmitting Power. Harvey D. Geyer, Dayton, Ohio, assignor to General Motors Corporation.

proportion to the distance from the axis, but the thickness increases abruptly near the periphery. This latter feature greatly reduces the stress in the outer portion of the rubber ring, and so reduces or eliminates the tendency of the rubber to start tearing loose from its bond with the metal surfaces at the outer edge.

Aluminum-Alloy Process

A U. S. patent has been granted Helmer Bengston, Indianapolis, Ind., and assigned by him to the Aluminum Company of America, which covers the so-called anodic process as applied to aluminum-alloy pistons. In his specification the inventor says he has found that when an aluminum piston is provided with an oxide coating and this coating is further provided with what may be termed resident oil absorbed by its surface, several benefits accrue. By using oxide-coated pistons it is possible to fit the pistons with only about one-half the normal clearance, and to operate the new engine at higher speed without danger of seizing or scuffing of the pistons. This result is a function of the peculiar method in which the oxide coating and its resident oil react to engine-operating conditions. The small amount of resident oil which is absorbed by or absorbed in the coating apparently does not leave it at operating temperatures, but appears to aid in maintaining a film of oil between the oxide-coated walls of the piston and the cylinder walls. In one instance an oxide-coated aluminum piston made in accordance with the invention ran for several hours in a small, high-speed engine without lubrication other than that provided by the resident oil in the coating, without the usual signs of scuffing or seizing.

To form the coating, the piston may be made the anode in an electrolyte consisting of an aqueous solution containing 25 per cent by weight of sulfuric acid. A lead cathode is used and a voltage of about 12 volts impressed upon the cell. The bath is agitated and circulated and kept at a temperature between 70 and 75 deg. F. and the piston treated under these conditions for about 40 minutes. After the coating is formed, the coated piston may be rinsed in clear water and dried, and oil may then be absorbed by or absorbed in the coating, as by immersion of the piston in a bath of oil, or rubbing it with oil. If desired, the piston may be heated before immersion in the oil, to drive off water that may have been previously adsorbed by the coating.

Internal Brake

IN internal brakes in which the expanding member is in the form of a band, some means must be provided to force the central section of the band against the drum when the ends are being forced apart in brake application. Heretofore this outward pressure has been produced by different means, such as a strut hinged to the brake band and a stationary anchor pin, a wedge member having an angular surface which slides over a stationary anchor member, or a bellcrank hinged or journaled upon a stationary anchor pin having one arm operatively connected to the brake band to receive the torque delivered by the brake band when moved circumferentially and the other arm operatively arranged with respect to the brake band to deliver an outward pressure thereon. These various mechanisms are said to be open to the objections that considerable friction is developed in them, which interferes with the accurate distribution of the torque; that they are difficult to lubricate and often freeze. These difficulties are claimed to be

Now . . .

A BEARING THAT THROWS THE LUBRICANT

On THE BALLS NOT Off

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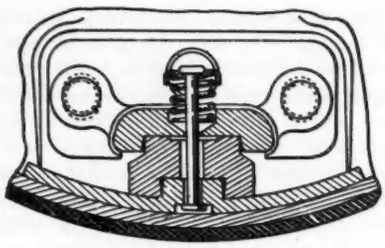

overcome in a patent which has been assigned to Kelsey-Hayes Wheel Co.*

One embodiment of the invention is illustrated by the drawing reproduced herewith. The patent covers essentially the combination of a brake drum, brake friction means within and adapted to engage the drum, a stationary anchor member, a rocking anchor member having different bearings upon the stationary anchor member and friction means for each direction of rotation of the drum to press a portion of the friction means outwardly against the drum, and means other than bearings for operatively connecting the friction means and rocking member to rock the latter upon circumferential movement of the former.

* Patent No. 2,054,186. Brake Construction. John Wm. White of Detroit.

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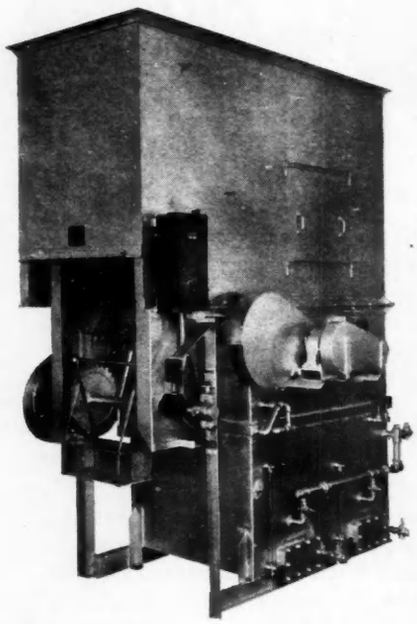
METAL CLEANING



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Metal parts are rendered clean and dry, ready for painting, plating, assembly, inspection, etc.

Literature or a free demonstration furnished upon request.

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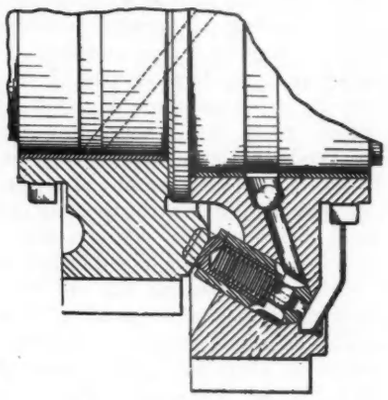
New Type of Transmission

IN the newer type of transmission, in which the different gear speeds are engaged by positive clutches, there are a number of gears which normally rotate freely on their shaft. These gears are provided with plain bearings, and as the bearings must be a rather close fit in order to assure quiet gear operation, their lubrication presents something of a problem. In a patent assigned to the White Motor Company* a plunger-type oil pump is inserted into one of two adjacent gears and is actuated by a face cam formed on the other gear. As long as the transmission is in operation, these two gears turn at different speeds, and the pump plunger is therefore constantly being reciprocated. A sheet-metal ring applied to the gear in which the pump is located forms an oil reservoir adjacent thereto, and the pump draws from this



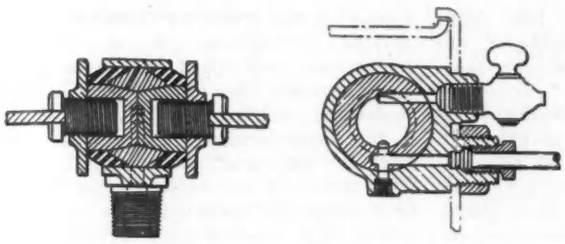
source. It forces oil to the bearing of the gear in which it is located directly, through a radial hole through the gear and its bushing, while the bearing of the adjacent gear is supplied with lubricant by cutting circumferential grooves on the shaft about midway of the length of both bearing portions and bringing the two grooves into communication by means of a drill hole extending through the axis of the shaft.

* Patent No. 2,053,542. Lubricating Means for Change-Speed Mechanisms. Francis M. Vandervoort of Cleveland, Ohio.

Hydraulic Brake Cylinder

PRESENT-DAY hydraulic brake cylinders are more or less subject to leakage of the hydraulic fluid and require attention and repair from time to time. In a patent assigned to General Motors Corporation* means to prevent such leakage are provided.

The brake cylinder is a one-piece casting having an externally threaded projecting portion designed to extend through a hole in the brake backing



Sampson Brake Cylinder

plate and to take a nut by means of which it is fastened to that plate. This projection has a central drill hole through which the brake fluid enters the cylinder. There are two pistons within the cylinder, adapted to move into and out of opposite ends. Flexible rubber packing means hermetically seal the joint between the cylinder and the pistons. The packing means for each piston comprises a molded cone-shaped member of resilient rubber having its outer and smaller end fixed and sealed to the piston and its larger end fixed and sealed to the cylinder. When the pistons move outwardly the rubber cones are put in tension.

In the manufacture of the device, the cylinder casting, filler block and two plungers are assembled together and the uncured rubber blanks to form the two cones are put in place. This unit is then set in the vulcanizing mold and the rubber is vulcanized *in situ* and strongly bonded to the cylinder and the two plungers. To prevent the rubber from being vulcanized also to the filler block, the latter may be made of a hard, non-metallic material to which rubber does not bond, such as bakelite or hard wood, or if of metal, may be given a coating of soap just before the uncured rubber cones are put in place.

*Patent No. 2,050,736. Hydraulic Brake Cylinder. Frederick W. Sampson, Dayton, Ohio.

New Mexican Highway Booms Automobile Tourist Travel

The Mexican government's expectations of great economic benefit resulting from the highway between Mexico City and Nuevo Laredo, Texas, were based upon practical estimates, it has been proved by the report of the Nuevo Laredo customs house that last year 20,654 cars driven by American visitors entered Mexico at that point. The majority of these cars followed the highway all the way to Mexico City. August, when 3559 cars passed through Nuevo Laredo, was the biggest month for touring last year.

Last year's motor tourist business seems the more remarkable when it is considered that only 4421 tourist automobiles entered the country in 1930, the year when Mexico began a systematic bid for foreign visitors.

There are strong indications that the automobile tourist traffic this year will be even greater than it was in 1936. During January, 2100 cars entered Mexico at Nuevo Laredo, compared with 964 cars in the corresponding month of 1936.

Commercial Vehicles in Germany

The following table gives the numbers of various types of commercial motor vehicles in service in Germany on July 1, 1936:

Motive Power	Buses	Trucks	Tank Trucks	Road Tractors
Carburetor engine	11,195	233,119	1,334	10,469
Diesel engine	3,921	28,878	76	8,957
Hot-bulb engine	...	...	...	10,941
Gas generator	48	798	...	55
Steam power	5	16	...	31
Electric power	13	5,874	...	301
Compressed gas	364	506	...	17
Total	15,546	269,191	1,410	30,771

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Peoria Tractor Meet

(Continued from page 640)

McCormick presided and the following were elected members of the nominating group: W. H. Worthington, engineer, John Deere Tractor Co.; J. S. Erskine, engineer, International Harvester Co.; J. B. Fisher, vice-president, Waukesha Motor Co.; C. W. Smith, professor of agricultural engineering, University of Nebraska; E. F. Norelius, chief engineer; Allis-Chalmers Mfg. Co. C. G. Krieger, agricultural engineer, Ethyl Gasoline Corp.; and J. M. Davies, chief experimental engineer, Caterpillar Tractor Co., were previously appointed members of the committee, with Mr. Krieger as temporary chairman.

Mr. Woolson, at one morning technical session, spoke briefly on progress in Diesel engine design and the advances made possible by contributions of the tractor industry. Subsequent to his remarks, a resolution was offered and passed which expressed the appreciation of SAE members for the courtesy extended them, during the Peoria session, by the Caterpillar Tractor Co.

Six technical papers were presented, abstracts of some of these being published in the April 24 issue of AUTOMOTIVE INDUSTRIES. E. A. Mallet's paper, not abstracted in the previous issue, covered the extension in use of resistance welding operations. "Automobile manufacturers," Mr. Mallet reported, "are now making 8-ft. long flash welds on bodies, and hundreds of spot welds are made on each body and frame of a modern car." The author of the paper pointed out the wide application of spot, projection and flash welding operations in the tractor industry and exhibited slides showing many welded tractor parts.

Factors affecting the design and performance of fuel injection equipment for Diesel engines were discussed in a paper presented by J. M. Davies, E. W. Jackson, and G. C. Riegel. The authors emphasized the point that injection equipment, ordinarily regarded as a relatively delicate engine part, has been revealed in their experience to be just as durable in service as other wearing parts, and that the major difficulty with injection systems is caused by dirt in fuels. Contamination in distillates was attributed to faulty handling after the fuel leaves the refinery.

Messrs. Davies, Jackson and Riegel discussed their subject from three principal viewpoints: first, materials suitable for injection system parts, their selection and heat treatment with consideration for minimizing deleterious effects attributable to dirt; second, design of the system to promote convenient replacement and service in the field; finally, proper handling of fuel to eliminate dirt and precautions in engine design adopted with a view to preventing abrasives from entering the injection system.

The authors concluded: ". . . by provision for use of relatively clean fuel in equipment designed to be least affected by ordinary slight contamination, the service problem for Diesel injection equipment is definitely less troublesome than for much of the other mechanical equipment in engines."

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N. Y. Maintenance Show a Success

Several thousand jobbers and retailers of automotive service and repair equipment attended the first metropolitan automotive maintenance show, held in the Commerce Hall of the Port Authority Building in New York April 22. Indications pointed to a considerable volume of business. Safety for worker and automobile owner was emphasized in the design of the new equipment show.

George B. Ingersoll

George B. Ingersoll, Dearborn, Mich., died suddenly April 17 of a heart attack at the age of 50 years. Until his resignation in 1932 to practice law, Mr. Ingersoll was chief engineer of the Federal Motor Truck Co. He was a member of the SAE, the Michigan Patent Law Association and the Michigan Bar Association.

Books

of automotive interest

Metal Statistics 1937. Published by the American Metal Market, 111 John Street, New York, N. Y. $2.

This is the thirtieth annual edition of the familiar little book which contains about all the available figures of economic interest on ferrous and nonferrous metals. The subjects covered range from pig-iron to platinum, and all the figures given are from authoritative sources.

Applying Natural Laws to Production. Published by the Mathews Conveyer Co., Ellwood City, Pa.

An interesting attempt to arrive at a general philosophy of mass production which naturally is dependent upon the efficiency of materials handling. "Continuous flow materials handling is now entering a new phase," according to the well argued thesis. "Its magnitude as a basic principle is being recognized in the design and building of entire factories. In the not too distant future the conveyer system for the whole plant may be first in all of its details and then the architect will plan and the builder erect the plant structures around it."

Fulton Co. Increases Capital To Add Production Facilities

The Fulton Co., 1912 South Eighty-second Street, Milwaukee, a pioneer manufacturer of automotive equipment, has increased its capitalization from 100,000 shares of common stock to 300,000 shares and the preferred from 50,000 shares to 100,000 shares. Additional production facilities are contemplated because of the heavy demand from manufacturers as well as the wholesale trade.

Bantam Advertising Account to Ketchum, MacLeod & Grove

The American Bantam Car Co., Butler, Pa., has retained Ketchum, MacLeod & Grove, Inc., Pittsburgh agency, to handle advertising for its line of passenger cars and light trucks. Production of Bantams is expected to begin in about two months in the plant of the former American Austin Co., which was purchased a year ago by the Bantam company.

Automotive Metal Markets

(Continued from page 645)

that The Federation of Raw Materials, a cartel of virtually all of the European steel-producing countries, has contracted for 625,000 tons of scrap in the United States in the last two weeks, all for shipment before September, the scrap problem again becomes an outstanding one for American steel mills.

Pig Iron—Buying by automotive foundries in the Middle West market has been brisk. Some of the blast furnace owners have nothing further to offer at this time. While the decision of steel manufacturers not to raise third quarter prices has not been without its influence on the pig iron situation, there is still talk of a possible advance.

Aluminum—The market paid no attention to Washington reports of a judicial probe of the aluminum situation. The price of primary metal was unchanged with the market for secondary metal also quotably unchanged, but decidedly easier in its undertone. Canadian exports of aluminum in March were the highest since last November.

Copper—With the London market turning firmer on Tuesday, the price of electrolytic copper here, until then more nominal than actual, became rather steady at 14½ cents. Before that, the weakness abroad had caused smelters to lower their scrap price by $5 a ton.

Tin—The London market suffered another sinking spell early this week, sending Monday's price for spot Straits here to 55⅜ cents, a decline of 1⅞ cents from the preceding week's close. On Tuesday, however, the market in London turned strong, with the result that the price for spot Straits here was marked up two cents to 57⅜ cents.

Lead—Steady and unchanged.

Zinc—Fairly steady and unchanged.

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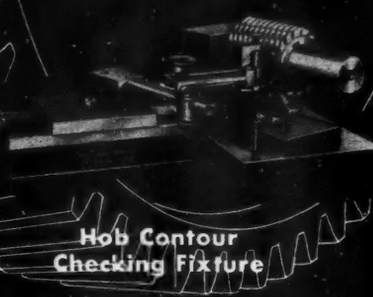
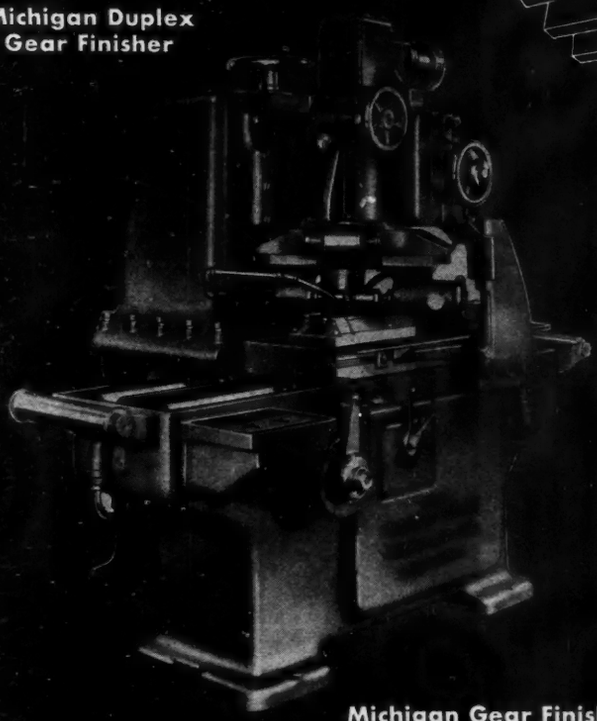
Michigan Duplex Gear Finisher

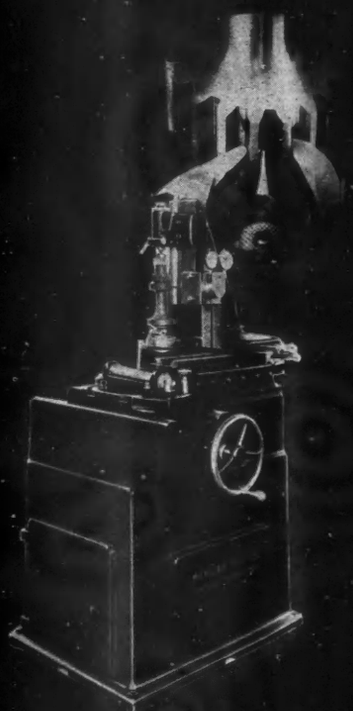


Hob Contour Checking Fixture



Michigan Gear Finisher

Hob and Worm Lead Checker



Tooth Form and Spacing Checker